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CONTENTS.

PAGE

ADVERTISEMENTS 97

INDEX OF APPLICATIONS FOR PATENTS 98

REVIEWS—

Scientific Publications of the United States 100

COOKING BY SOLAR HEAT 101

IMPROVEMENTS IN APPLYING MOTIVE POWER IN THE PROPELLING OF LOCOMOTIVE AND MARINE ENGINES 101

JULIUS ROBERT VON MAYER 102

AMERICAN ACADEMY OF SCIENCES 102

PROCEEDINGS OF THE INSTITUTE 104

MONTHLY NOTICES 104

PROGRESS OF THE INVENTORS' INSTITUTE ... 105

PROCEEDINGS OF SOCIETIES—

Royal Society 106

Societies Continued—

PAGE

Geographical Society 106

Astronomical Society 106

Geological Society 107

Zoological Society 107

Society of Arts 107

Mathematical Society 107

New Shakspere 107

Historical Society 107

Physical Society 107

Asiatic Society 108

Society of Antiquaries 108

British Archæological Association 108

Numismatic Society 108

Chemical Society 109

Societies Continued—

PAGE

Institution of Civil Engineers 109

Meteorological Society 109

Royal Society of Literature 109

Anthropological Institute 109

A READY MEANS OF ESTIMATING THE VALUABLE CONSTITUENTS OF CEREALS 109

FOREIGN SCIENCE 110

CORRESPONDENCE 110

MANUFACTURE OF CHLORIDE OF LIME 110

RECENT AMERICAN AND FOREIGN PATENTS... 111

THE SURREY GARDENS 111

SOUVENIR AT BELAIR VILLA 111

ADVERTISEMENTS 111

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Pictures, Portraits, &c.—H. Bogaerts, 2264.

Pillars, Columns, Posts.—C. T. W. Piper, 2058.

Pipes, Tubes and Syphons; Joining Pipes.—W. R. Lake (com.), 2116. F. Goodall, 2168. G. Juengst, 2171. R. Long, 2225. F. Holt, 2322. C. J. Galloway and J. H. Beckwith, 2410.

Pistons, &c.—A. D. Spencer, 2243. W. Gibb, 2262. A. S. Fleutelot, 2333.

Plants, Trees, Seaweeds, &c.—F. C. Nutter, 2054.

Ploughing, Digging, Clod Crushing, Land Rolling, Harrowing, Agricultural Implements, Tilling and Cultivating Land.—G. T. Plumbley, 2433.

Preserving and Preparing Articles of Food.—W. R. Lake (com.), 2261.

Presses; Compressing.—A. M. Clark (com.), 2034. W. Freakley, 2043. W. R. Lake (com.), 2147. W. R. Lake (com.), 2217. W. R. Lake (com.), 2218. J. Watson, 2307.

Printing and Transferring; Type and other Surfaces for Printing, Composing, and Distributing Type.—W. R. Lake (com.), 2031. G. A. M. Malleval, 2109. A. M. Clark (com.), 2200. J. Butterfield and J. W. Mason, 2214. J. Christie and C. J. Izatt, 2240.

Propelling Machinery, Transmitting Power and Motion, Converting Movements. — H. J. Haddan (com.), 2124. A. M. Clark (com.), 2291. A. S. Fleutelot, 2333. A. S. Grosclauder, 2441.

Propelling Ships, Propellors, Paddle-wheels, and Screws.—S. Pitt (com.), 2068. Sir H. De Burgh-Lawson, Bart., 2152. H. Pullar, 2181. J. Adams and F. W. Flower, 2276. L. Perkins, 2301. J. Sample, 2421.

Pulleys.—J. Bond, 2128. A. M. Clark (com.), 2375.

Pumps, Pumping and Raising Water and other Liquids, Pumps, Pistons, and Packing.—T. P. and E. J. Preston, J. T. Prestige, and J. Dalby, 2030. W. E. Newton (com.), 2233. W. Allan (com.), 2239. J. H. Storey and J. Westley, 2272. J. Adams and F. W. Flower, 2276. A. Vacherot, 2285. J. Stannah and G. Pucker, 2296.

Rags and Waste, &c.—C. A. Burghardt, T. Rowley, and A. C. Salomonson, 2340.

Railways, Permanent Way, Rail Joints, Chairs and Sleepers, Portable Railways, Atmospheric Railways, Switches, points, Crossings, and Turntables.—V. Demerbe, 2065. W. E. Gedge (com.), 2241. E. Purser, 2435.

Railways, Carriages, Coupling, Uncoupling, and Altering Position of Carriages and Engines.—J. Edwards, 2022. J. Livesey, 2025. T. Wolstencroft, 2026. B. Rhodes, 2053. J. M'Lachlan, 2198. W. R. Lake (com.), 2314. H. Entz, 2320. F. Holt, 2322. H. Shaw, 2368. J. L. Clark and E. J. Hill, 2374. C. Barlow (com.), 2391. M. Abrahams, 2427. T. Rickett, 2445.

Reaping, Mowing, Making Hay, Gathering in Produce.—E. H. Tooley, 2317. O. S. Gage (com.), 2371.

Refrigerating, Cooling Liquids, Making Ice.—H. Aydon, 2048. G. W. von Nawrocki (com.), 2078. W. R. Lake (com.), 2116.

Registering, Indicating, and marking.—H. A. Bonneville (com.), 2079. A. Andrew, 2222. A. M. Clark (com.), 2289. M. Abrahams, 2427. H. A. Bonneville (com.), 2454. G. W. Warren, 2468.

Retorts and Crucibles; Melting Pots.—R. S. Ripley (com.), 2069.

Road making and paving, Cleaning Streets.—W. R. Lake 2218. A. Neuberg (com.), 2294. H. Baggeley, 2390.

Ropes, Cords, &c.—T. Archer, 2122. F. G. Riley, 2363. J. Rowbottom, 2414. G. Dixon, 2462.

Salt.—H. Ransford, 2151.

Sculpture, Statuary.—F. von Dechend, 2458.

Sewing and Embroidering.—W. Dawes, 2119. A. V. Newton (com.), 2127. E. B. Evers (com.), 2230. J. Fraser and J. Ower, 2268. F. Simmons, 2302. P. Jensen (com.), 2327.

Shears, Scissors, &c.—T. Brown, 2247.

Ship and Boatbuilding. —W. E. Leslie and N. Hamblin, 2063. Sir H. De Burgh-Lawson, Bart., 2152. W. R. Lake(com.), 2408. R. W. Vivers, 2411. H. M. Bullivant, 2466.

Ships' Rigging and Sails, &c.—J. Bond, 2128.

Shirts, Collars, &c.—B. J. Mills, 2210. G. F. Harwood, 2219.

Shot, Shell, Bullets, &c.—S. Pitt (com.), 2135.

Shuttles.—J. E. Wadsworth, 2207.

Sifting, Sorting, and Separating.—H. J. Haddan (com.), 2035. H. B. Sears (com.), 2319. W. R. Lake (com.), 2342. J. H. Johnson (com.), 2351.

Signals, Alarms, Communicating Apparatus, Conveying Sounds.—B. Woodcock and S. Birkett, 2088. A. F. St. George, 2193. J. Rettie, 2312. W. R. Lake (com.), 2344. W. Morgan-Brown (com.), 2365. H. A. Bonneville (com.), 2454.

Soap.—W. R. Lake (com.), 2261.

Sowing Seeds and Distributing Manure.—W. Ruddiman and J. Johnstone, 2061. G. W. Murray and T. Ferguson, 2197.

Spades, Shovels, &c.—F. Parkes, 2143. J. Ralph and H. Sims, 2194. T. Brown, 2248. C. D. Abel (com.), 2304. H. Fisher, T. Twigger, and E. Ross, 2348.

Spinning and Preparing for Spinning.—J. Chapman, 2042. A. Ogden, T. Marsh, and J. Clayton, 2077. J. Taylor, 2108. W. T. Thompson, 2129. G. Brook, G. Sykes, and J. Stake, 2142. B. and J. Wright, 2164. S. Roberts and S. Hirst, 2165. S C. Lister, 2191. J. Hendry (com.), 2199. R. Wilson, 2201. J. Horrocks, 2318. E. Smith and W. Hinchcliffe, 2358. W. Walton, 2362. J. Shaw and J. Hague, 2377. J. Boyd, 2404.

Springs.—L. A. Grosclaude, 2441.

Starch.—A. Sezille, 2321.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water Feeding Apparatus for Boilers.—W. P. Thompson (com.), 2023 W. R. Lake (com.), 2049. C. M. Lombart (com.), 2101. W. R. Lake (com.), 2116. A. M. Clark (com.), 2132. J. Horrocks, 2176. J. H. Storey and J. Westley, 2272. G. A Wilson and J. Lewis, 2355. H. Turner, 2357. J. T. Stammers, 2370. H. A. Byng, 2395. C. J. Galloway and A. H. Beckwith, 2410. T. Bohme, 2448.

Steam Engines (Stationary, Locomotive, and Marine.)—F. P. and E. J. Preston, E. Prestige, and J. Dalby, 2030. T. Greenacre and C. F. T. Young, 2038. S. Pitt (com.), 2068. J. E. Bott, 2104. W. E. Gedge (com.), 2223. A. D. Spencer, 2243. L. Francq, 2253. A. Vacherot, 2285. J. Stannah and G. Pucker, 2296. H. P. Holt, 2311. W. R. Lake (com.), 2314. F. H. F. Engel (com.), 2316. F. Holt, 2322. A. Dobson, 2326. E. Wigzell and J. Pollit, 2356. C. Shaw, 2366.

Steering or Guiding Ships, Carriages, Ploughs, &c.—S. Pitt (com.), 2068. J. H. Wilson, 2099. J. and L. Watson, 2227. A. Paul and J. Haythorn, 2328. L. Thomas, 2437.

Stone and Slate, Artificial Stone and Marble Grindstones and Millstones.—W. Lester, 2232. A. B. Childs, 2352.

Sugar and Syrups, &c.—H. H. Murdoch (com.), 2211. C. B. Child and E. Giles, 2263. C. D. Abel (com.) 2280. A. Sezille, 2321.

Sulphur.—J. Hammond, 2376.

Surgery, &c.—H. A. Dufrene (com.), 2055. J. Banks, 2067. C. B. Longhnan, 2134.

Telegraphs; Telegraph Printing Apparatus.—B. J. B. Mills (com.), 2024. F. Frimmer, 2137. A. F. St. George, 2193. W. H. Preece, 2202. A. C. Engert, 2288. E. A. Cowper, 2385. T. A. Edison, 2396. H. J. Haddan (com.), 2456. H. J. Haddan (com.), 2457.

Thermometers, Barometers, Pyrometers.—W. D. Bowlett, 2256. F. A. J. B. Comte de Saintignon, 2400. O. Stenille, 2438.

Thimbles.—A. M. Clark (com.), 2074.

Thrashing Machines.—A. C. Henderson (com.) 2113. W. R. Lake (com.), 2206.

Tobacco and Snuff, Cigars, Cigar-holders, Pipe and Cigar-lighters, Smoking-pipes, Tobacco-pouches.—A. M. Clark (com.), 2051. G. W. von Nawrocki (com.), 2059. S. Moorhouse, 2076. N. L. Nathan, 2138. J. Koch, 2155. W. Scott and J. Yair, 2172.

Tools, Tool Holders.—F. Parkes, 2143.

Torpedoes.—W. R. Lake (com.), 2408. W. M. Bullivant, 2466.

Tramways and Tramway Carriages, Tramway Locomotives.—J. M'Lachlan, 2198. T. Williamson and A. Younger, 2398.

Umbrellas, Parasols, &c.—J. Miniere, 2173.

Upholstery, &c.—J. M. B. Baker, 2066. J. Royle, 2160.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of Fluids.—A. Taylor, 2020. T. Greenacre and C. F. T. Young, 2038. W. R. Lake (com.), 2049. J. H. Wilson, 2099. J. A. Daniel, 2208. A. Andrew, 2222. W. E. Gedge (com.), 2223. J. J. and W. A. Tylor, 2228. T. B. Fishwick, 2284. J. Stannah and G. Pucker, 2296. H. P. Holt, 2311. T. L. Paterson, 2337.

Velocipedes, Bicycles. — W. Hillman, 2249. W. Morton, 2258. T. J. Bell, 2367.

Ventilation; Supplying and Purifying Air for Buildings, Mines, Ships, Carriages, &c.—H. Aydon, 2048. W. Cowley, 2254. A. R. and J. W. Harding, 2287. H. M. Williams (com.), 2290.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—E. Brainerd (com.), 2144. T. Bohme, 2448. S. Pitt (com.), 2464.

Waterclosets, &c.—C. Wendt, 2019. C. Winn, 2073. J. J. and W. A. Tylor, 2228. B. C. Cross, 2324. H. Moore, 2412. M. Abrahams, 2427.

Waterwheels and Engines, &c.—A. Vacherot, 2285.

Waterproofing, &c.—W. W. Seymour, 2046. J. Northrop and T. Illingworth, 2267.

Wearing Apparel for Gentlemen, Military Outfits, &c.—J. G. Wilson com.), 2086. E. T. Hughes (com.), 2297.

Weaving, Braiding, Plaiting, Preparing for Weaving.—R. Gooch, 2044. J. Mitchell, 2072. J. S. Sutcliffe, J. S. Smith, and J. Fielding, 2107. G. A. M. Malleval, 2109. W. E. Jefferson, 2131. J. Reyle, 2160. W. R. Lake (com.), 2188. J. E. Wadsworth, 2207. D. Skirving and S. Ayland, 2295. G. H. Tattersfield, 2415. T. S. Carus, 2418. J. Hardaker, 2429. T. Bundle and J. Bradshaw, 2511.

Wheels for Carriages, &c.—E. de Pass (com.), 2146. D. Greig, 2236. T. J. Bell, 2367. R. C. Marsell, 2419.

Window Blinds, &c.—W. Nightingale, 2274. J. L. Clark and E. J. Hill, 2374. W. L. Hosking 2426. C. Haarburger, 2460.

Windows and Sashes, &c. — T. Wolstencroft, 2326. G. Scudamore, 2196. R. Evered and G. Clarke, 2369. J. L. Clarke and E. J. Hill, 2374. R. W. Vivers, 2411. T. Rickett, 2445.

Wire-Working, Wire Ropes, Telegraph Cables.—B. J. B. Mills (com.), 2074. G. Imray, 2041. P. M. Justice (com.), 2183.

Woods and Veneers, &c.—W. King, 2083.

*** *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

Reviews.

SCIENTIFIC PUBLICATIONS OF THE UNITED STATES.

"Smithsonian Report."
"The Western Review of Science and Industry." Edited by Theo. S. Case, Kansas City, Mo. Journal of Commerce Printing and Publishing House.
"International Review." New York.
"The Scientific American." New York.

To our minds the scientific publications of the United States have a reality about them very difficult to find in periodical publications issuing from British publishing offices. For whilst we do not encounter much of that extreme technical elaboration which is often to be met with in high-class scientific publications in this country, so also we look uselessly for that lightsome treatment of scientific subjects, which, to give it a brief name of characterisation, is the presentation of *science in holiday guise*. In short, our American cousins are in science, as in many other matters, disposed to act in such a thoroughgoing plain-speech way as in these days of touch-and-go acquaintance with every kind of human learning, so much in vogue amongst "Britishers," appears quite a novelty to us.

As we know that the readers of the Scientific Review care little for plausible theories, but have much regard for facts, we shall at once turn to the pages of one of the journals we have referred to, "The Western Review," and present them with a quotation from an article on a subject which everybody finds interesting—the Pyramids of Egypt. It is headed "The Great Pyramid and its Symbolism," by Rev. James French, Denver, Colorado, who, in a very readable, yet exhaustive, essay, proceeds as follows:—

The Pyramids, on account of their huge proportions and great age, have long been classed among the seven wonders of the world.

To obtain some idea of the Great Pyramid of Egypt, let us imagine a vast space, covered over with huge blocks of rock brought from the mountains across the valley of the Nile, over a causeway prepared for the purpose, which preparatory work, according to Herodotus, took 100,000 men ten years to accomplish.

This army of labourers lay off a thirteen acre field, and begin to arrange the rocks in rows, not only all around it, but all over it, filling in all crevices till it is one solid mass. Then they pile a second layer over the first, and a third over the second, and so on till they get as high as the tall forest trees, say eighty feet in height. Then they build on till they reach double that height, one hundred and sixty feet; then till they treble it, two huudred and forty feet; then till they quadruple it, three hundred and twenty feet. They continue to ascend, day by day, week by week, month by month, and year by year, till they rise higher by far than the tallest steeple in the world, till they reach a height more than a third as high as a forty acre field would be if turned up edgewise. The base of this immense structure is more than half a mile around, and when a man stands on the top he cannot throw a stone half way to the outside of the base. This faint description may convey some idea of the hugeness of this structure, and what gave it the rightful claim to be classed first among the seven wonders of the world. There it stands to-day as it stood before the days of Moses or Abraham, older than history either profane or sacred, over four thousand years old, the oldest, the tallest, the most solid and substantial building on the earth.

We shall be excused if we stand awhile and tarry and gaze at this wonder, and take time to grapple with the questions—When, and How, and Why was this structure erected. If the statements published to the world are to be credited, there are newly-discovered wonders in that artificial "Rocky Mountain," by the side of which what we have been considering shrink into almost inconceivable littleness. I refer particularly to the discoveries of Professor Piazzi Smyth, Astronomer Royal for Scotland, Sir John Herschel, Colonel Howard Vyse, John Taylor, William Petrea, and others. I am aware that some of the theories and claims of these men are regarded as more chimerical than substantial. Nor do I wonder that scientists, confirmed in preconceived notions which are adverse to these discoveries, should, upon their first announcement, regard them as sheer nonsense, the fancies of a one-idea brain, and that in their offended prejudices against what at first sight appears absolutely absurd they should turn from the subject with disgust as absolutely unworthy the attention of scholars. But admit the facts which we propose in this paper to demonstrate, and with Professor Smyth they must acknowledge that "the Great Pyramid is the highest and holiest subject that can ever occupy the attention of a scientific society." The new American Cyclopædia (a standard authority and a library in itself) in its article on this subject notices Professor Smyth's theory and his claims (that astronomical problems and metrical systems are memorialised in the Great Pyramid). But it disposes of these claims very summarily by declaring that they were not supported by hieroglyphic inscriptions, nor the testimony of the ancients. Of course they were not. This is a most important admission. But is it scholarly to discard facts because of recent discovery? I shall now treat the problems in this venerable structure with such figures and forms of expression as seem most adapted to convince, not in the order of their discovery or importance, but in the way most likely to attract attention, till the beholders are anchored in its intricacies and compelled to consider its tremendous facts.

Problem I.—*The perimeter of the Pyramid equals the periphery of a circle whose radius is the vertical height of the Pyramid.* This problem the writer of the article quoted very fully demonstrates; as also another problem—That *the distance of the sun from the earth divided by twice the Pyramid's height equals its polar diameter*; which Mr. Denver states he has evolved out of a problem discovered by Wm. Petrea, Civil Engineer.

A third problem demonstrated is, that *the Pyramid symbolises a cycle of our solar system around a very remote centre*, which principally enunciates the views of Sir John Herschel as to the peculiar entrance to passages and chambers in the Pyramid fifty feet up. That *the Pyramid presents a symbolical ten-division metrical system* is stated as a fourth problem, and is very elaborately and pleasantly discussed, as to which we extract the following statement:—

"The thermal ten division is remarkably simple and comprehensive. It fixes 0° as the mark where water freezes, 250° as the boiling point." . . . "Thus 50° point as the exact temperature of the Pyramid's holy place, a chamber aired by two ventilators, and walls polished like fine jewellery, where it is said are found the counterparts to the sacred symbols in Solomon's Temple, and where the temperature never varies from 50° from one end of the year to another."

The article is illustrated by drawings or diagrams, which add materially to its interest.

The Smithsonian Institute is probably well known to our readers, but its journal is, we think, not quite so well known. In a recent number is an important article, "Kinetic Theories of Gravitation," by William B. Taylor, of Washington, who commences his article thus:—

"Ever since the grand demonstration by Newton in 1682, that the moon is a falling body, observing precisely the same law of decline from a rectilinear path as the cannon ball, and that it is therefore under the dominion of the same force, an eager and unceasing desire has been manifested to discover an antecedent or origin of this universal tendency of matter. Even before this date, or in 1671, the ingenious Dr. Robert Hooke had endeavoured to trace the cause of gravitative fall to the external action of waves in a surrounding medium. He appears to have been led to this reflection by observing that small bodies floating on the surface of agitated water collected toward the centre of disturbance or the origin of the waves. Newton himself, as is well known, speculated on this subject, and some years before arriving at his great generalization, he threw out a suggestion as to the cause of *terrestrial* gravity in a letter to Mr. Boyle. As connected with this speculation, it may be well to recur to Newton's still earlier statement of his conceptions in regard to the nature and action of the æther. In a letter to Mr. Henry Oldenburg, secretary of the Royal Society of London, in January, 1675-6, he thus unfolds the hypothesis:

"'First, it is to be supposed therein that there is an ætherial medium, much of the same constitution with air, but far rarer, subtiler, and more strongly elastic. But it is not to be supposed that this medium is of one uniform matter, but composed partly of the main phlegmatic body of the æther, partly of other various ætherial spirits, much after the manner that air is compounded of the phlegmatic body of air intermixed with various vapours and exhalations; for the electric and magnetic effluvia and the gravitating principle seem to argue such variety. Perhaps the whole frame of nature may be nothing but various contextures of some certain ætherial spirits or vapours, condensed as it were by precipitation, much after the manner that vapours are condensed into water. . . . *Thus perhaps may all things be originated from æther.* . . .'

"'In the second place, it is to be supposed that the æther is a vibrating medium like air, only the vibrations far more swift and minute; those of air made by a man's ordinary voice succeeding one another at more than half a foot or a foot distance, but those of æther at a less distance than the hundred-thousandth of an inch. And as in air the vibrations are some larger than others, but yet all equally swift (for in a ring of bells the sound of every tone is heard at two or three miles' distance in the same order that the bells are struck), so I suppose the ætherial vibrations differ in bigness but not in swiftness.'"

Mr. Taylor goes on to show that Newton subsequently proceeded with further investigations, and states as the final result that Newton afterward, as if driven back from every assault to the only retreat, which in earlier years he had stigmatized as "so great an absurdity" that no competent thinker could ever fall into it," he desparingly asks: "Have not the small particles of bodies certain powers, virtues, or forces, by which *they act at a distance?* . . . What I call 'attraction' *may* be performed by impulse, or by some other means unknown to me. I use that word here to signify only in general any force by which bodies tend toward one another, whatsoever be the cause." And beyond this point, no human research has since been able to penetrate. This last and presumably deliberate judgment of Newton is a quarter of a century later than the inconsiderate utterances of his third "Bentley letter," which have been so eagerly seized upon by every speculative writer intent on propounding new theories of the universe.

The *International Review* is a high-class work, from which we recently quoted some valuable remarks as to the Centennial Exhibition in America; and the *Scientific American* has so often been brought under the notice of our readers that it is needless to speak of its great merits.

"Design and Work." This useful serial is, we are glad to say, progressing satisfactorily.

COOKING BY SOLAR HEAT.

W. ADAMS, writing to the editor of the *Scientific American* on this subject, says:—I send you a short account of my experiments, made in Bombay, on the utilization of solar heat for cooking. The cooking apparatus consists of a conical reflector, made with wood and lined with common silvered sheet glass. Inside there is placed a copper cylindrical vessel, covered by a glass cover. The cooking vessel is raised about four inches from the bottom, and the glass cover is five inches longer than the vessel, and two inches wider, which leaves an interval of four inches of hot air under the boiler and one inch all round at the top. There is a wedge under the apparatus to keep it inclined, so that the rays of the sun may fall perpendicularly on the boiler. Glass being diathermanous to the direct or reflected rays of the sun, and non-diathermanous to obscure heat, the rays penetrate the glass, and, striking on the vessel, become transformed into obscure heat, when they are retained by the glass. The glass cover over the boiler is made octagonal, because, in that form, common window glass can be used. Of course a glass dome, such as is used for covering clocks or statuettes, would be better, and, equally, of course, a copper reflector electroplated with silver would be better than my reflector; but both of these articles are made octagonal in order that cheap material may be employed. The position of the apparatus requires to be changed about every half hour, to face the sun in its apparent course from east to west. The rations of seven soldiers, consisting of meat and vegetables, are thoroughly cooked by it in two hours, in January, the coldest month of the year in Bombay, and the men declare the food to be cooked much better than in the ordinary manner. Several people in Bombay and in the Deccan have tried it, and always with success. If the steam be retained the dish is a stew or a boil; if it be allowed to escape the food is baked. The reflector is two feet four inches in diameter. The intensity of the heat is increased by increasing the diameter of the reflector. One advantage of this apparatus is that the food will keep hot for a long time after the apparatus has been withdrawn from the solar rays. I withdrew it at 4 p.m., brought it into a room, and threw a railway rug over it. At 8 p.m., when it was uncovered, the metal vessel was too hot to be handled by the bare hand. I have a letter from a Surgeon General in the service, which informs me that he cooked a leg of mutton in it, and that it "kept hot for four hours" after having been removed from the air.

I am getting one made six feet in diameter, consisting of fourteen flat glasses instead of eight, and by having an angle of 45° until it is on a level with the middle of the vessel, and thence upward an angle of about 60°, by which arrangement the whole of the rays reflected from the silvered glass will fall on the lower half. Besides cooking food, I am making a series of experiments for heating steam boilers by concentrating the rays of the sun upon them.

For this purpose I use a combination of flat mirrors, of common sheet glass, silvered, fixed in rectangular frames so as to concentrate the solar rays to a focus at a distance of 20 feet. The focus is about 2 feet in diameter. The plan is on the same principle as that of Archimedes, by which he burned the Roman fleet, which, under Marcellus, was blockading Syracuse—the same plan as that suggested by Anthemius of Tralles in the problems by which he proved the exploit of Archimedes to be possible; and as that suggested by Kircher, and in 1747 adopted by Buffon. With 72 pieces of silvered sheet glass, each 15 by $10\frac{1}{2}$ inches, at midday, in the month of May, a focus was formed, at a distance of 20 feet, of a temperature above 1,088° Fah. I arrived at that estimate as follows: 18 glasses raised the mercury in the thermometer to 360°; 36 glasses raised it to over 644°, when the mercury entered into ebullition, and consequently any further rise could not registered. The ebullition of the mercury was very violent. Placing the temperature produced by the 36 glases at 644°, the boiling point of mercury, and deducting 100° as the initial temperature of the atmosphere (the thermometer was in the shade), there remain 544° produced by 36 glasses. The focus from the remaining 36 glasses was then added, making 72 glasses; and I think it may be inferred that the temperature was then above 1,088°. Every kind of wood placed in this focus was instantly ignited, without being, as in Buffon's experiment, previously smeared with tar and shreds of wool. A solid cylinder of water, 18 by 8 inches, contained in a vertical copper vessel, provided with a steam pipe, was then placed in the focus, and it boiled in exactly 20 minutes. The ebullition was exceedingly violent. In January last I made another experiment with 198 glasses, each 15 by $10\frac{1}{2}$ inches, fixed in 10 rectangular frames. A copper boiler containing 9 gallons of cold water was placed in the focus at 9.25 a.m. It commenced to boil in exactly 30 minutes. It was allowed to boil for exactly 1 hour, and at 10.55 the focus was turned off, when $3\frac{3}{4}$ gallons of water were found to have been evaporated.

My next experiment will be made with about 500 of these glasses, fixed in 20 rectangular frames, each 6 feet by about 4 feet. The focus will be about 2 feet in diameter, and (according to the calculation made on the basis of the results of the experiment with 72 glasses) the temperature will be over 7,616° Fah. The objects of that experiment will be to ascertain how soon after sunrise the water can be provoked to boil, the pressure that can be obtained in a given period, and the quantity of water that can be vaporized in a given time. Other experiments will be made, such as exposing different metals to the focus, &c. The boiler that will be used on that occasion is a vertical boiler, 2 feet 7 inches high and 16 inches in diameter, with an annular cylinder of water 3 inches in diameter up to half its height. It is made of beaten copper, $\frac{1}{4}$ inch thick, which will stand any pressure that can be produced in a boiler of those dimensions. It is provided with a steam pipe, a steam gauge, and a safety valve, and with no other fittings. The 20 frames will stand in two rows of 10 each, the second row on a platform 6 feet 6 inches high, forming a segment of a circle of 40 feet in diameter.

As there is no limit whatever to the number of these mirrors that can be used at once, there is none to the intensity of heat that can be produced, and consequently no limit to the force of the steam that can be generated. The cost of the reflecting material is next to nothing, and it is almost everlasting. There is no mechanical difficulty in keeping the focus on the boiler from soon after sunrise to a little before sunset.

I am aware of the force of the objection that the solar rays are sometimes intercepted by clouds, even in India; but as an auxiliary to the ordinary boilers, I believe that solar heat could be used so as to save at least 25 per cent of coal throughout the year by my plan. As coal in the seaports of India is never under 30 shillings per ton, and double that rate in the interior, such a saving would be exceedingly important. There are many other purposes to which it could be applied besides driving steam machinery or cooking food, such as distilling and rectifying spirits, &c. At Aden, for example, the sun always shines, and potable water is only obtained by distilling it from salt water.

I shall be very glad to have any expression from your readers upon the subject, especially upon the result of the experiment that I have described.

IMPROVEMENTS IN APPLYING MOTIVE POWER IN THE PROPELLING OF LOCOMOTIVE AND MARINE ENGINES.

MR. GEORGE BEESLEY, C.E., of St. Paul's-road, Kennington, has recently specified his patent for "Improvements in the application of Steam or other motive power in Locomotive and Marine Engines." From this document we extract the following statements:—

Description of fundamental mechanical principle of the improvements.—The improvements contemplated are grounded in, and have been deduced from, the principles of the lever and its mechanical operation when embodied in the form of a wheel.

Mechanical arrangement.—The object or purpose of the invention is the application of the power of the engine to the machinery of the driving wheels or propellers in such a manner that the rectilinear motion of the pistons is transmitted to the working point on the crank arm in one direction only, viz., the direction of the progressive movement.

The mechanical arrangements for accomplishing this purpose, by directing and controlling the application of the steam power, are as follows, viz.:—In locomotive engines the cylinders must be placed horizontally, or nearly so, and be fixed in position as usual, but the piston rods and connecting rods, instead of being attached to crank arms at right angles to each other, must be attached to opposite cranks, *i. e.*, cranks 180°, apart or thereabouts. By a suitable arrangement of the valves, the steam may be admitted to either end of the cylinders, according to the direction the locomotive is required to travel; but only one of the corresponding ends of the two cylinders will be used at one time, and the pistons of the two engines will be driven forward alternately, and always in direction of the engine's advance, the steam working from one of the corresponding ends of the cylinders only when the engine is proceeding in one direction, and from the opposite end alone when the direction of the progressive motion is reversed. The engines to be used therefore are of the single-acting class; and as the strokes of the pistons of the two engines occur alternately, one continuous and nearly uniform force is constantly exerted on the mechanism of the driving wheels or propellers. By this means the influence of the backward stroke of the double-acting engines at present employed—which counteracts the agency of the forward stroke and greatly impairs the propelling efficiency,—is entirely removed.

The same principle is applicable in navigation to paddle-wheel or other ship propellers, which act upon the lever principle or directly.

To the ordinary screw or other rotative propeller, whose centre of motion is in the axis of revolution, the principle of this invention does not apply.

Principle of the invention may be realised by double action of engines in certain cases.—In cases where wheel-gearing is not inadmissible and may be desirable—as on colliery railways or in locomotives for common roads where slow speeds only are required, and also in marine engines—the principle of the invention is realised by means of wheels and shafting intervening between the pistons of the engines and the working point in the machinery of the driving wheels or propellers as follows, viz.:—The pistons with their connecting rods are attached to cranks on separate wheels or shafts, and the motive power is thence transmitted to the circumference of a wheel fixed upon the wheel or shaft of the propeller, and constantly actuating it in the direction of the progressive motion. By this mechanical arrangement engines working on the "double-acting" principle may be employed if expedient; and smaller cylinders or lower pressure of steam, &c., will thus provide for the development of an equally effective power. And as the point in the wheel of the driving shaft of the propeller which receives the power of the engines is always at a maximum distance from the centre of motion or fulcrum at the rail, &c., and consequently acts with the most effective leverage, a greater tractive force will be developed with equal steam pressure.

Advantages of the invention.—Mr. Beesley states the benefits that will be derived from the improvement contemplated; they cannot be here detailed. It is sufficient to state that—

1st. The effective tractive force of the locomotive engine will be doubled, with the use of one-half the consumption of steam as at present employed; and consequently—with equal boiler power engaged—the efficiency of the steam will be quadrupled.

2nd. As the slipping of the driving wheels of locomotives on the rails is caused chiefly by the action of the back stroke, much lighter engines than those now employed will have sufficient adhesion to draw an equal load.

3rd. The tendency of some locomotives to horizontal rotation is principally occasioned by the resisting agency of the back stroke, and consequently there will be less liability to run off the rails when this resistance is removed.

4th. A very great reduction in the cost of construction and maintenance of the permanent way of railways, as also in the first cost and working expenses of the rolling stock, is a necessary consequence of the above-mentioned advantages.

5th. By simple alteration of the valve-gearing and change of the relative position of the cranks, existing locomotives can be adapted to work on the single-acting principle; and their power will be at once greatly augmented, and at the same time the consumption of steam reduced one-half.

6th. In the application of steam-power to locomotion in water by means of paddle-wheels or other direct acting propellers, corresponding improvement will be effected by the application of the single-acting principle above described; the slip of the wheels will be diminished, the effective power on the propellers will be augmented, and at the same time the consumption of steam be reduced by one-half; or, if the original generative capabilities of the boilers be exercised, the efficiency of the engines will be quadrupled.

JULIUS ROBERT VON MAYER.

ON the 20th ult. died Julius Robert von Mayer, of Heilbronn, in Würtemberg, a man whose labours in physical science have won for him an undying renown.

"The mechanical equivalent of heat" is an expression which was introduced into science by Mayer, who must always be regarded as having stood in the front rank of the founders of the dynamical theory of heat. In 1842, while practising as a physician in his native town of Heilbronn, he published a paper in which the relations which subsist between heat and work were defined, and a computation of the mechanical equivalent of heat was given. With no means to make experimental research, he calculated the value of the mechanical equivalent, by the help of the best data procurable at the time, on the assumption that when a body is heated by compression the heat developed is the equivalent of the work expended in compressing the body. Subsequent researches have shown that this assumption is true in the case of air, the substance from the properties of which Mayer drew his conclusions. It is not surprising, however, that the value that he obtained for the mechanical equivalent of heat was far from being the true one, for in 1842 the specific heat of air at constant volume, and the ratio of the specific heats at constant volume and constant pressure, were very imperfectly known. Yet, when corrected in accordance with the results of more recent experiments, his calculation does not differ much from the value of the mechanical equivalent obtained by others by totally different processes. In 1845 appeared Mayer's paper on "Organic Movement in Connection with the Transformation of Matter"—a *brochure* of 100 pages—in which he speculates fearlessly and acutely on the agency of the so-called vital force, establishing the principles that all the so-called forces are interchangeable forms of energy—the one sole force; that energy is never created or destroyed, and that all natural phenomena are accompanied by a change of the form of energy. In 1848 was published one of his most notable papers, under the title of "Celestial Dynamics." In this paper he calculates the heat that would be developed by the collision of the earth with a target strong enough to stop its motion, and propounds the hypothesis that the sun's heat is maintained by the falling of innumerable meteorites on its surface. One point especially worthy of note in this paper is his statement of the effect of tidal friction in dissipating the energy of a planet's aërial rotation—an effect which was proved by Adams and Delaunay to exist in the case of the earth.

Mayer's last paper "On the Mechanical Equivalent of Heat" was published in 1851. It possesses the same fulness of original ideas as its predecessors, and in point of clearness of conception and definition can only be rivalled by Tyndall's "Heat as a Mode of Motion."

Soon after the publication of his last work his mind became affected in consequence of severe labours and disappointments he had suffered, and the rebuffs he had met with from scientific contemporaries; and though at a later period he partially recovered, he was never able to resume his scientific investigations.

It must be claimed for Mayer that, in an obscure German town, without the means of making experiments, entirely isolated from scientific companionship, and with only the time that he could spare from his professional duties, he evolved in a remarkably short period a succession of theoretical views which, in point of originality, boldness, and comprehensive grasp of facts, stand among the foremost in the history of physics.

AMERICAN ACADEMY OF SCIENCES.

THE annual meeting of the above-named association was convened at Washington, D.C., on April 15, under the presidency of Prof. Joseph Henry. The following are brief abstracts of the papers read:—

ALACRANE REEF.

Prof. Alexander Agassiz desribed the formation and structure of Alacrane Reef, in the Yucatan Bank, which at first sight appears to present features incompatible with the general theory of the coral reefs of this region, as set forth by Mr. Darwin, but on a more careful examination it confirms that theory. It is believed that the whole region of the Florida reefs and neighbourhood is one of elevation. Cuba is the axis of elevation, and eventually this formation will fill the whole space of those waters. The elevation is comparatively recent. Alacrane Reef will serve as an epitome of the whole. Similar observations had been made on the neighbouring coast of South America, and Prof. Agassiz believes there is evidence to show that before this elevation, and late in the Tertiary period, the place now occupied by the Isthmus of Panama was the seat of a great equatorial current, which has produced a marked effect upon the fauna of adjoining oceans.

WATERSPOUTS.

Prof. Ferrel spoke on the mathematical theory of waterspouts, and stated that a waterspout is simply the cloud by means of the centrifugal force of the gyrations diminishing the tension. It is not the fall of a body of water carried up as water. The conditions which give rise to a waterspout continue to supply it with material to support it. With a high temperature and an unusually low dew point, differing 16° from the air, waterspouts a mile high have been produced.

MARS' MOONS.

Prof. Asaph Hill read an essay on the orbits of the satellites of Mars. The eccentricity of the inner satellite is very large, and this is the reverse of what would be expected if the diminution of its orbit had been occasioned by a resisting medium. The distance from its primary of the outer satellite is calculated at 12,500 miles; of the inner, 3,600, about as far as from Washingto Berlin.

THE SALT OF THE SEA.

Prof. Hilgard described an optical ocean salinometer, for the determination of the saltness of the sea at different depths and localities. The new instrument resembles a spectroscope with telescope attached. The sea water to be examined is poured into a triangular bottle, which takes the place of the prism in the spectroscope. Light is admitted through a slit made by covering with black varnish all except a narrow space in a lens, and a lamp can be placed before this slit, all parts being practically secure against shaking by the motion of the ship. Prof.

Hilgard said that with this instrument a very regular scale of values had been attained.

Prof. Alexander Agassiz gave a very interesting account of deep sea dredging in the Gulf of Mexico, and especially described

THE RECENT IMPROVEMENTS IN SOUNDING APPARATUS.

In sinking the lead to great depths, heavy weights are required. On the Challenger the only mode of ascertaining that the lead touched bottom was by noticing when the rope ran out more slowly than before. This operation was performed with a very heavy rope, such strength being necessary to hold the weights employed in sinking it. It was liable to an error of perhaps 300 fathoms in giving great depths. It is strange that the English did not use the invention of their own countryman, Sir William Thomson, instead of the antiquated sounding rope. The improvement principally consists in substituting a piano wire. This, after running out, leaves the shot, with which it is weighted, on the bottom. Repeated soundings with the piano wire on board the Blake indicated that the accuracy attained was within one-hundredth of one per cent; the Challenger soundings were only within five per cent. The time gained by using the wire is quite remarkable; for instance, twenty to twenty-five minutes as compared with two hours. The iron shot weight left on the bottom of the ocean is, perhaps, a sixth of that lost by the old process.

Prof. Agassiz showed the dredge as now modified and used on the Blake. It embodied a method which did the sifting at the bottom instead of the top of the ocean. A rope was so fastened to the dredge that it no longer tended to bury itself. After this had been successfully tried, a further improvement was made by substituting a flat box for the dredge, with net sides; this ran smoothly along the bottom without burying at all. Tangles were attached behind the dredge which were of great service.

The trawl was another instrument needing improvement. Its tendency was to turn over sidewise, and then catch nothing. On the Blake no such difficulties were encountered; they used a contrivance somewhat like an oyster trawl, that had the merit of doing its work equally well whichever side was up.

The clumsy apparatus of the Challenger made its work costly. The total weight of dredge, rope, and shot in three miles depth was three tons, and of course the rope wore rapidly under such a strain, and often parted while out. The British expedition lost 50,000 fathoms of such rope. The Blake expedition could not afford loss at a similar rate, even for a season's cruise, and it was determined to do for dredging what had been done for sounding—to substitute wire for rope. With wire, the dredge served sufficiently as a weight. The time saved by using wire with the dredge was as great proportionally as with the sounding lead. Hauls were made in two hours that would have consumed eight hours on the old plan, and five or six hauls were made per day instead of one. In three weeks some sixth as much was done as in the three or four years' work of the Challenger.

RESULTS OF THE CHALLENGER EXPEDITION.

The following observations are reported by Prof. Agassiz:—Where the depth is 1,800 to 2,000 fathoms inside the Windward Islands, the fauna corresponds to that of the Atlantic outside; the animals having doubtless penetrated through the openings between the islands. All classes of the animal kingdom found in the ocean are well represented. Inside the Caribbean Sea the fauna is more specialised and characteristic. On the Challenger expedition it had been ascertained that the red clay ooze of the ocean bottom was largely a result of the decomposition of the shells of surface animals—a disintegrated portion of the limestone contained in those shells. Everywhere in the Gulf a similar deposit was found. Pelagic animals, chiefly mollusks, may be said to fill this sea from the surface to 8, 10, or 25 fathoms in depth. The dredge always brings up a quantity of their half-decomposed shells, and in instances where the test of proportion was carefully tried, it was found that more than half the mud consisted of shell fragments. There is no doubt that a stratum is forming at the bottom of the sea, due entirely to the coverings and hard parts of pelagic animals which exist in swarms near the surface. On the question as to the existence of many animals in deep water, near neither the surface nor the bottom, Prof. Agassiz is inclined to distrust the Challenger observations. The apparatus there used could not furnish proof as to the point whether the animals were really caught at the depth of 1,000 fathoms or near the surface. The fruits of the towing net may have been gathered anywhere in its course.

In the course of this expedition the temperatures of the Gulf Stream were ascertained throughout, from top to bottom, and through the whole area. The fact had been first noticed by Dr. Carpenter that an enclosed sea, such as the Mediterranean, may have a higher temperature for its depths than corresponding depths of the ocean. The difference in that instance is 35°. It is caused by the fact that the ocean water flowing into the Mediterranean has to cross a barrier at Gibraltar; the depth there is about 500 fathoms, and the temperature at that depth is that of the sea to the east of it, the cold water at the bottom of the Atlantic either never rising so as to float over that barrier, or, if it does, being warmed to the high temperature while in transit. The Caribbean Sea is similarly enclosed by barriers, and its waters at their greatest depths are only as cold as that of the lowest soundings on the barriers. Similar observations are on record about the Soloo Sea and other bodies of water thus marked off by submarine or surface elevations surrounding them.

MEASURING STARLIGHT.

Prof. Pickering has devised an instrument for the special purpose of comparing the components of double stars. The images are separated by a Nicoll's prism, and there are various contrivances for preventing error. A chart is in preparation at Harvard of all the double stars north of 40° latitude; at present this work is about half done, 90 stars having been finished and reported upon, requiring 4,000 observations. The probable error in this work is less than the tenth of a magnitude. A star in Cassiopeia gave a great deal of trouble; the discrepancy in the observations upon it amounted at times to half a magnitude; eventually a faint companion was discovered which accounted for the changes. It was long suspected that Gamma Ceti's companion shines by reflected light. It was a matter of great interest, as no planet has yet been recognised outside of the solar system. The test is, of course, the polarisation of light. After forty or fifty observations, the Gamma Ceti case was determined to be no exception to the general rule. A special research to obtain a quantitative estimate of the difference of light in coloured double stars has yielded unexpectedly uniform figures from different observers, and shows that such stars yield abundant light, notwithstand their colour. The companion of Sirius is estimated to be of about the ninth magnitude. Investigations to ascertain whether its light is reflected or not are as yet uncompleted. The working of the double star photometer is very satisfactory.

ABRASIONS OF THE NORTH-WEST COAST OF AMERICA.

A very long essay was read by Prof. Geo. Davidson on the abrasions of the north-west coast of America. It was chiefly occupied with a description of the appearance of the coast ranges and hills that face the Pacific from Mexico to Alaska. Viewed collectively, they present a series of flat topped rocks, hills, beaches, and plateaus; of terraces cut into such general shapes by an agency of wide application. The various admitted agencies for transforming the terrestrial surface were considered separately, and shown to be inadequate for this result. Professor Davidson ascribes it in connection with the gradual elevation of the coast, to a great ice belt which followed the shore line and performed this gigantic sculpture.

THE SIZES OF MOLECULES.

Dr. Wolcott Gibbs discussed the question as to what allowance should be made for the molecules of a gas in calculating its contraction under pressure, the contraction applying probably to the spaces around each molecule, and not to the molecules themselves. Some of the results are very curious. If we assume that in hydrogen we have nothing to deal with but the molecular and intermolecular spaces, it will follow that in one entire metre of hydrogen, at a pressure of 0 and temperature of 4° C., the molecular volume amounts to 538·9 cubic centimetres. In other words, the molecules occupy 539 millionths of the whole space. Under a pressure of one atmosphere, a cubic metre of hydrogen contains 545 cubic centimetres of matter. The relation of nitrogen to hydrogen at the same temperature and pressure for the ratio of volume of molecules is as follows: H divided by N is equal to 1 divided by 2·77; that is, the volume of the molecules of nitrogen in one cubic metre of the gas is 2·77 times as great as the volume occupied by the molecules of a similar quantity of hydrogen. In the latter gas at 4° and one atmosphere, the mean free path of the molecules is 458 times their individual diameters; in nitrogen, 167·4 times. The diameter of an atom of hydrogen is to be expressed in centimetres by 42 divided by 10 raised to the ninth power; an atom of nitrogen, 54, also divided by 10 raised to the ninth power. This is in striking accord with the results obtained through other lines of research. The mean distance of the centres of the molecules of hydrogen will be, in centimeters, 512 divided by 10 raised to the ninth power; nitrogen, 607 similarly divided. Finally, Boyle and Mariotte's law holds good (for certain limiting conditions of pressure), provided it be applied solely to the interstitial spaces and not to the molecular matter of gases.

Prof. S. P. Langley called the attention of the Academy to the similarity between the A and B lines of the spectrum. The likeness of the A group of lines is so very marked as to indicate that they, too, are of telluric, not solar, origin.

Prof. Henry communicated the closing address, mainly relative to the work of the Academy, and the ground of selection of its members, which, he said, must be actual scientific labour in the way of original research; that is, positive addition to the sum of human knowledge; and this qualification of a candidate must be united with unimpeachable moral character. Not social position, popularity, extended authorship, or success as an instructor can entitle to membership; this is due alone to actual new discoveries: nor are these sufficient if the reputation of the candidate is in the slightest degree tainted with injustice or want of truth.

At the election of officers, Prof. O. C Marsh was elected Vice-President and Prof J. H. Coffin, Home Secretary.

The death of the Baron von Ettinghausen has recently been recorded.

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F. W. CAMPIN, Sec.

Proceedings of the Institute.

EXECUTIVE COUNCIL.

On 27th June the Executive Council met, and after the minutes of the last meeting had been passed, and the finances reported upon by the Secretary, as also the steps taken with regard to the Special Finance Committee appointed by General Meeting, and some discussion on the position of Mr. Anderson's Patent Reform Bill, the proceedings terminated.

MEMBERS' MEETING.

The report of the proceedings at the Meeting on 27th June will appear in our next.

Monthly Notices.

"*Posts and Telegraphs, Past and Present,*" to which he has appended an account of the Telephone and Phonograph, is reported to be the subject of a book Mr. Tegg is writing. The volume is dedicated by permission to Mr. Tilley.

The International Geological Congress, it is now fixed by the local committee, will open in Paris on the 29th of August, and will remain a fortnight in session.

The Telephone, it appears, according to the statements of M. Bourrouze before the Académie des Sciences of Paris, may have its circuit closed by the earth, the sounds being transmitted with great distinctness without a return wire.

Search for Gallium in English Blende.—Mr. Lettsom has been engaged collecting for M. Lecoq de Boisbaudran specimens of English blende, to be examined for the presence of gallium. Some specimens in the Cornish collection at Oxford, labelled as blende, were found not to contain either zinc or sulphur, but were essentially phosphides of didymium and erbium. Mr. Lettsom has given the name of Rhabdophane to this mineral.

The action on Selenium ascribed to light is due, according to the experiments of M. Forssman, to another order of undulations—non-luminous.

Some experiments on the microphone which greatly simplify this instrument—ordinary gas cinders being employed as the transmitter and receiver of sounds—have been brought before the Royal Society of Edinburgh by Mr. James Blyth. Prof. Hughes has also shown the Physical Society some remarkable facts resulting from new arrangements of the microphone, which clearly indicate some new conditions regulating the movements of sonorous waves by which we may hope to advance to a more perfect knowledge of the laws of sound, and the physiology of the laws of hearing.—*Athenæum.*

The Miners' Association of Cornwall and Devon has just issued its eighteenth Annual Report. It is very satisfactory to find that, notwithstanding the extreme depression which prevails in the mining districts, no fewer than two hundred papers were satisfactorily worked by the pupils—young working miners—a considerable number of which placed their authors in the first class of the advanced stage of the Science and Art Examinations.

A stringed telephone, to enable deaf people to hear, is being applied it appears with success by Mr. Severn, of New South Wales.

Baron von Bibra, the novelist and naturalist, died at Nuremberg on 5th June.

A "New Plutarch" is in preparation. The leading feature of the series is that each biography will be that of a man of action, in himself interesting and remarkable, whose career covers and illustrates some important period or episode in history. The volumes at present arranged are Victor Emmanuel, by Edward Dicey; Judas Maccabæus, by Lieut. C. R. Conder, R.E.; the last Emperor of Constantinople, by Rev. W. J. Brodribb; Coligny, by Walter Besant; Richelieu, by W. H. Pollock; Abraham Lincoln, by Charles Leland; Richard Whittington, by James Rice; Hannibal, by Samuel Lee; Harold Fairhair, by Erik Magnússon; Charlemagne, by Prof. Beesley; and Haroun al Raschid, by Prof. E. H. Palmer. Other volumes will be arranged. The order of publication will not be chronological. The editors of the series, which will commence in October, and be continued at regular intervals, are the Rev. W. J. Broddribb and Mr. Walter Besant. It will be published by Messrs. Marcus Ward and Co.

Prof. John Morris, F.G.S.—Want of space has prevented us from giving an extract from the speech of the Public Orator at Cambridge University (Mr. G. J. Sandys) in presenting to Prof. Morris the Honorary Master of Arts degree, as the speech is replete with expressions of high estimation of the worthy Professor.

Spiritual Notes is the title of a new monthly periodical devoted to the literature of Spiritualism and Psychology, and the proceedings of societies embracing those subjects. It is published by E. W. Allen, Ave Maria-lane.

Mr. Sayce's large work, his "Introduction to the Science of Language," is now ready to go to press. The first chapter gives an account of Greek and modern theories of the nature and origin of language, with criticisms of each.

THE PROGRESS OF THE INVENTORS' INSTITUTE.

On Thursday, 23rd of May, 1878, the annual general meeting of the members of the Inventors' Institute was held at 4, St. Martin's-place, Trafalgar-square, the President, Sir Antonio Brady, in the chair. Amongst those present were also Admiral J. H. Selwyn, Vice-President of the Institute, and Messrs. F. H. Varley, Ch.E.C., Dr. J. McGrigor Croft, Sen. M.E.C., Messrs. T. Blanchett, T. Morgan, A. J. Murray, S. Calley, M. Zingler, Hellier, and other well known members of the Institute. The minutes of the last annual general meeting were read by the secretary, Mr. F. W. Campin, and passed as correctly entered. The report of the Executive Council was then read by the secretary. It was as follows :—

Sixteenth Annual Report of the Council (Executive) of the Inventors' Institute.

In presenting the Sixteenth Annual Report, the Executive Council have again to refer to the fact that the most prominent of the objects for which the Inventors' Institute was established, namely, the improvement of the Patent Laws, is a matter still in abeyance, a Bill being at the present time before the House of Commons, which was brought in by Mr. Anderson, Mr. Mundella, Mr. Dalrymple, and Mr. Alex. Brown, the tenor and effect of which is to enlarge the term of Letters Patent from 14 to 21 years, and at the same time to reduce the cost to a considerable extent; that is to say, the present Stamp Duties are, by this Bill, replaced by the following Schedule of Stamp Duties :—

	£	s.	d.
On petition for grant of Letters Patent...	2	10	0
On certificate of record of notice to proceed...	2	10	0
On warrant of law officer for Letters Patent	2	10	0
On the sealing of Letters Patent	2	10	0
On the Specification	2	10	0
On Letters Patent at the end of seven years	25	0	0
On Letters Patent at the end of fourteen years	50	0	0
On certificate of record of notice of objections	2	0	0
On certificate of every search and inspection	0	1	0
On certificate of entry of assignment or license	0	5	0
On certificate of assignment or license	0	5	0
On application for disclaimer ...	5	0	0
On caveat against disclaimer ...	2	0	0
On office copies of documents, for every 90 words	0	0	2

This Bill, although it aims only at an instalment of reform, viz., in regard to reduction of cost (the extension of time to 21 years being the only clause outside of cost), not in any way reversing the present system, either in regard to the granting of Patents, or in reference to rendering the grant more secure, certain, and protective, has, nevertheless, been received with satisfaction by inventors, and the Executive Council have felt themselves bound to give it hearty support. Hence, at a recent meeting, the Executive Council passed a resolution that a petition in its favour should be presented to the House of Commons, and empowered our president and the secretary to prepare and sign such a petition, and procure the presentation of the same.

This petition was as follows :—

"To the honourable the Commons, &c., sheweth—

"Your petitioners are the governing body of the Inventors' Institute, an association of Inventors and others interested in the progress of Invention, comprising amongst its members some of the most eminent Inventors of the day.

"Your petitioners have good grounds for believing that, in order to facilitate the progress of Invention, with the view to supporting the prosperity of the country, that patents for Inventions should, in each case, be obtainable for a small sum of money; as the pecuniary means of the great majority of Inventors (very many of whom belong to the working classes) will not allow them to pay large sums of money for patents. Further, your petitioners consider the term of 14 years is too short, and ought to be extended. The above views being strongly impressed on your petitioners, they have learnt, with satisfaction, that a Bill for the amendment of the Laws relating to Letters Patent for Inventions has been brought into your hon. House, by Mr. Anderson, Mr. Mundella, Mr. Dalrymple, and Mr. Alex. Brown.

"Your petitioners, therefore, pray that your hon. House will pass the above-named Bill this session, so that it may become law without delay.

"Signed on behalf of the Executive Council of the Inventors' Institute, and by authority of a resolution thereof,

"(Signed) Antonio Brady, Knt., President.
F. W. Campin, Secretary."

This petition was duly presented by Mr. Anderson to the House of Commons.

The Bill has now arrived at the stage for second reading, and it is impossible to say whether it will move along or not; indeed, it may be doubted whether the Government will allow it to proceed. However, it may probably lead to some action being taken by the Attorney-General, whom, it will be remembered, last year brought a Bill into the House of Commons; which, although it contained many points considered very objectionable, and was, therefore, opposed by the Institute, as well as inventors generally, yet it contained a schedule in which some reduced Stamp Duties were enacted; therefore it is not beyond the bounds of possibility that the present Bill may be made the basis of a compromise measure for settling the patent question for some time to come.

Such a scheme was suggested at a recent meeting of the Inventors' Institute, namely, on 11th April, when Mr. M. Zingler and Mr. Lancaster made some observations on the details of the Bill, which, though wholly favourable to the same, were understood to put forward the proposition that the Bill would be a sufficient settlement of the patent question for the present time, if the term of provisional protection were prolonged to *one year*, as in the Attorney-General's Bill last year, and its cost reduced to *ten shillings*, and in addition to this *Special Paid Commissioners* were appointed to work the patent system, with *every regard to facilitating investigation into the novelty of patenting inventions*, and *pointing out to Parliament what amendments in the patent laws are desirable.*

Although the patent laws have, as usual, had the foremost place in the regards of the Executive Council, still the other objects for which the Institute was established have been by no means forgotten, and papers have been procured to be read at the members' meetings of as great interest and importance as in former years.

The papers alluded to were the following :—

By Mr. G. E. Pritchett, "On Indicating Correct Time throughout a Building by Concurrent Operation of One Standard Clock Mechanism."

By Mr. F. W. Campin, on behalf of several Inventors, "On some Improvements Applicable to the Permanent Way of Railways."

By Mr. G. G. Laurence, "On Arrangements for Lowering Boats from Ships for Saving Life at Sea."

By Mr. McCrarie and Mr. Pritchett, "On some Improvements Applicable to the Telephone."

By Mr. W. C. Hughes, "On Lighting by Means of New Lamp Arrangements Specially Applicable to the Magic Lantern."

By Mr. Davies, "On Quick Speed Steering Apparatus for Ships and Vessels."

Besides these papers at several members' meetings, what we term Expositions of Inventions have taken place—that is, gentlemen have brought before such meetings models of Inventions, and given verbal explanations of them; meetings of this kind having been established by the Executive Council in consideration of the fact that very many Inventors prefer to display their Inventions in this way to preparing and reading regular papers.

The list of papers has, however, in consequence of the necessity for giving attention to the Patent Laws, been somewhat curtailed, but has been larger than any list for some years past. All the papers have been noteworthy, and some of them attracted large audiences, and received favourable notice in the daily and weekly press. They have, of course, been duly reported at length in the Journal of the Institute (Scientific Review). And the Executive Council propose that the thanks of the general meeting be given to the readers of all the papers above mentioned, as also to those gentlemen who have brought their Inventions before the Institute.

Under the new rules, one-third (4) of the Executive Council retire from office; they are, however, eligible for re-election; but as the rules require four members of the Executive Council to be present to form a quorum, and the elective members number only 12, it is desirable that no one should be elected who cannot attend at least every alternate meeting (the regulation meetings being one per month).

The number of members of the Institute is still, in round numbers, 500. Although there have been resignations, the accessions of new members have more than compensated for the reduction of the list thereby occasioned.

In order to increase the usefulness and influence of the Institute, the Executive Council have decided to recommend the addition to the General Council of 12 names of members of high position.

It was moved from the chair, seconded by Mr. Hellier, and carried unanimously,—That this report be received and adopted, also that the 12 names proposed to be added to the General Council be added thereto, subject, of course, to the acceptance of office by the gentlemen named.

It was proposed by Mr. F. W. Campin, seconded by Mr. F. H. Varley, and carried unanimously with loud acclamations, — That, as the rules of the Inventors' Institute do not expressly require that the presidentship shall be subject to annual election, and Sir Antonio Brady has shown himself to be such an efficient and worthy president of the Institute, he is hereby elected as permanent President.

It was moved by Mr. F. W. Campin, seconded by Dr. J. McGrigor Croft, and carried unanimously,—That Admiral J. H. Selwyn, who has, by his valuable aid in forwarding the interests of Inventors and the Institute, shown himself a most worthy occupant of the position of Vice-President, and also the other Vice-Presidents at present on the list, be, and are hereby, elected permanent Vice-Presidents.

It was moved by Mr. Hellier, seconded by Mr. F. W. Campin, and carried unanimously,—That the four members of the Executive Council who, pursuant to the rules now retire from office, viz., Messrs. F. H' Varley, Dr. J. McGrigor Croft, W. H. Barlow, and A. J. Murray, be, and are hereby, re-elected members of the Executive Council.

It was moved by the PRESIDENT, seconded by Mr. F. H. VARLEY, and carried unanimously,—That Mr. F. W. Campin, who has with so much attention and ability fulfilled the office of secretary of the Inventors' Institute, be, and is hereby, re-elected secretary thereof for the year ensuing. Also that Messrs. W. Smartt and J. P. Cutts be, and are hereby, re-elected auditors for the year ensuing.

The President, Vice-President, Admiral J. H. Selwyn, on behalf of himself and the other Vice-Presidents, the Secretary, and the Auditors' in signifying their acceptance of the positions assigned by the above resolutions, respectively tendered their thanks.

It was resolved, on the motion of Mr. F. W. CAMPIN, seconded by Mr. A. J. MURRAY, and carried unanimously,—That as circumstances have prevented the presentation at the present meeting of a complete Balance Sheet, the President, Vice-President, Admiral Selwyn, Dr. J. McGrigor Croft, and F. H. Varley, Esq., be, and are hereby, appointed a special Finance Committee, with full power to examine and pass a proper and sufficient Balance Sheet.

Votes of thanks were then accorded to the President, the Vice-Presidents, and the General Council, the Executive Council, the Secretary, and the Auditors. These being duly responded to, the meeting terminated.

The complete list of office bearers of the Institute now stands as follows:—

President of the Institute—Sir Antonio Brady.

Council (including V.P.'s and Executive):—*The Right Hon. the Earl of Caithness, Vice-Pres.; *Sir Thomas Fairbairn, Bart., Vice-Pres.; *Beresford Hope, Esq., M.P., Vice-Pres.; *His Grace the Duke of Manchester, Vice-Pres.; *Robert Richardson, Esq., C.E., Vice-Pres.; *Adml. Jasper Selwyn, R.N., Vice-Pres.; *Sir Fothergill Cooke, Vice-Pres.; *Cromwell F. Varley, Esq., F.R.S., &c., Vice-Pres.; *Henry Bessemer, Esq., Vice-Pres.; *C. Williams Siemens, Esq., C.E., D.C.L., F.R.S., Vice-Pres.; *F. H. Varley, Esq., C.E., C.E.C. Inst.; *H. A. Allardyce, Esq.; Alexander Allan, Esq., C.E.; T. Aveling, Esq.; P. W. Barlow, Esq., C.E., F.R.S.; *W. H. Barlow, Esq., C.E., F.R.S.; W. G. Beattie, Esq.; *T. Blanchett, Esq.; *F. Braby, Esq.; M. P. W. Boulton, Esq.; *S. Calley, Esq.; Genl. Sir A. Cotton, K.C.S.I., &c.; *F. W. Campin, Esq., F.R.S.L. (Sec.); Samuel Chatwood, Esq.; D. K. Clarke, Esq., C.E.; W. Conisbee, Esq.; Dr. Robert H. Collyer, F.C.S.; A. A. Croll, Esq.; Samuel Courtauld, Esq.; H. C. Coulthard, Esq., C.E.; *Dr. J. McGrigor Croft; Robert Davison, Esq., C.E.; William Dempsey, Esq., C.E.; *Captain Fairholme, R.N.; John Farmer, Esq.; J. Faulding, Esq., C.E.; C. Finzel, Esq.; H. A. Fletcher. Esq., C.E., F.R.A.S.; G. W. Hemans, Esq., C.E.; W. T. Henley, Esq.; Alexander Mitchell Innes, Esq.; W. Mitchell Innes, Esq.; Dr. H. C. Jennings; Dr. P. W. Latham, M.A.; *D. J. McLauchlan, Esq.; Walter Macfarlane, Esq.; John Macintosh, Esq.; *Thomas Morgan, Esq., A.S.E.; George Frederick Muntz, Esq.; *A. J. Murray, Esq., C.E.; A. Normandy, Esq.; *T. Paterson, Esq.; W. H. Preece, Esq., C.E.; J. L. Pulvermacher, Esq.; T. W. Rammell, Esq.; John Ramsbottom, Esq., C.E.; *Fred. Ransome, Esq., C.E.; John Saxby, Esq.; A. Sedley, Esq.; W. Simons, Esq.; E. Sonstadt, Esq.; Berger Spence, Esq.; Peter Spence, Esq.; G. P. Tangye, Esq.; Robert Wheble, Esq.; W. N. Wilson, Esq.; *M. Zingler, Esq.

Secretary, F. W. Campin, Esq.; Auditors, J. P. Cutts, Esq., W. Smartt, Esq.

The * denotes Members of the Executive Council.

Proceedings of Societies.

ROYAL SOCIETY.

MAY 9TH.—Sir J. Hooker, President, in the chair.—The following papers were read: "On the action of Sonorous Waves in varying the force of an Electric Current," by Prof. Hughes,—"Note on the Minute Anatomy of the Thymus," by Mr. H. Watney,—"On the Classification of Loci," by Prof. Clifford, —"Description of the Harmonic Analyzer," by Sir W. Thomson.

MAY 16.—Sir J. Hooker, President, in the chair. — The following papers were read: "Experimental Researches on the Electric Discharge with the Chloride of Silver Battery, Part II. The discharge in Exhausted Tubes," by Messrs. W. De La Rue and H. Müller,—'Note on Legendre's Coefficients," by Mr. J. Todhunter,—"On the Spectrum of Metalloids, Spectrum of Oxygen," by Dr. Schuster,—and "On the Variations of the Diurnal Range of Magnetic Declination as recorded at the Prague Observatory," by Mr. B. Stewart.

MAY 23RD.—Sir J. Hooker, President, in the chair.—The following papers were read: "Researches in Spectrum Analysis, in connection with the Spectrum of the Sun," V.," by Mr. J. N. Lockyer,—"Observations on Arctic Sea-water and Ice," by Dr. E. L. Moss,—"Experimental Results relating to the Rhythmical and Excitatory Motions of the Ventricles of the Heart of the Frog,—"Contributions to the Anatomy of the Central Nervous System in Vertebrate Animals," by Mr. A. Sanders,—"On the Formation of Chloriodide and Bromiodide of Ethylidene," by Dr. M. Simpson,—"Note on the Specific Gravity of the Vapours of the Chlorides of Thallium and Lead," by Prof. Roscoe,—"Extract from the Report to Prof. Sir W. Thomson on the Brachiopoda dredged by H.M.S. Challenger," by Mr. T. Davidson,—"On the Equation of Circles, Second Memoir," by Prof. Casey,—"On the Bodily Tides of Viscous and Semi-elastic Spheroids, and on the Ocean Tides upon a Yielding Nucleus," by Mr. G. H. Darwin,—"Electrodynamic Qualities of Metals, Part VII. Effects of Stress on the Magnetisation of Iron, Nickel, and Cobalt," by Sir W. Thomson,—and "On the Existence of a Rudimentary Head-Kidney in the Embryo Chick," by Messrs. F. M. Balfour and A. Sedgwick.

GEOGRAPHICAL SOCIETY.

MAY 13TH.—Sir R. Alcock, President, in the chair.—The following gentlemen were elected fellows: Messrs. G. East, A. E. Hippisley, C. E. Lienhardt, C. Mackenzie, P. H. S. Montgomery, and Dr. S. Wise.—The paper read was "Geographical Results of Sir T. D. Forsyth's Expedition to Kashgar in 1873-4," by Capt. H. Trotter.

MAY 27TH.—*Anniversary Meeting.*—Sir R. Alcock, President, in the chair.—The following gentlemen were elected Fellows: Col. H. Renny, Major E. C. Sim, Capt. H. B. Phillimore, Messrs. F. Gaham, W. Hounsell, and J. E. Ward.—The Royal (Founder's) Medal for the Encouragement of Science and Discovery was awarded to Baron F. von Richthofen, for his extensive travels and scientific explorations in China, during which he mapped a great part of the Northern and Central Provinces of the empire, and made observations of great interest and originality on their physical geography; also for his great work now in course of publication, in which the materials accumulated during his long journeys are elaborated with remarkable lucidity and completeness. The Victoria or Patron's Medal was presented to Capt. H. Trotter, for his services to geography, in having conducted the survey operations of the late mission to Eastern Turkistan, under S. Douglas Forsyth, which resulted in the connection of the Trigonometrical Survey of India with the Russian surveys from Siberia; and for having further greatly improved the map of Central Asia by uniting his own work on the Upper Oxus with the exploration of the Mullah and Havildar further to the west, so as to give for the first time a nearly continuous delineation of the course of the river, from it sources in the Pamir Lakes to the frontiers of Balkh.—The prizes to public schools for 1878 were as follows: Physical Geography — Gold Medal, W. J. Newton, Liverpool College; Silver Medal, C. M. Wilson, Clifton College. Political Geography—Gold Medal, W. W. Ord, Dulwich College; Silver Medal, G. A. Tomkinson, Haileybury College.—It was announced that the subject for the examination in 1879, both in physical and political geography, would be "The Barbary States and the Sahara."—The following gentlemen were elected as Council and Officers for 1878-9: *President*, the Earl of Dufferin; *Vice-Presidents*, Sir R. Alcock, Admiral Sir A. Milne, Major-General Sir H. C. Rawlinson, and Sir H. C. Verney; *Treasurer*, R. T. Cocks; *Trustees*, Lord Houghton and Sir W. C. Trevelyan; *Secretaries*, C. R. Markham and R. H. Major; *Foreign Secretaries*, Lord A. Russell; *Council*, Sir H. Barkly, Hon. G. C. Brodrick, Sir T. F. Buxton, Right Hon. Lord Cottesloe, R. N. Cust, Sir B. H. Ellis, Capt. F. J. O. Evans, Sir T. D. Forsyth, D. W. Freshfield, F. Galton, Col. J. A. Grant, Major-General Sir W. H. R. Green, General Sir J. H. Lefroy, W. Mackinnon, Admiral Sir F. L. M'Clintock, Sir W. L. Merewether, J. Murray, Admiral Sir E. Ommanney, Sir R. W. Rawson, Major-General C. P. Rigby, and S. W. Silver.

ASTRONOMICAL SOCIETY.

MAY 10TH.—Lord Lindsay, President, in the chair.—Mr. Ranyard read a paper by Mr. Waterston, "On the Heat of Stars."—A number of papers describing observations of the recent Transit of Mercury were read. The Astronomer Royal said that he thought the observations of the bright spot upon the disc and rings around the planet should be received with very great caution, as such observations were made under the most trying conditions with regard to reflections from the surfaces of lenses and from the sides of the eye-tubes. It seemed very improbable that if the spot upon Mercury had an actual existence the rotation period of the planet should be such that the same part of the disc should always be presented to the Earth during the transits when the bright spot has been observed. Mr. Christic, who had observed at Greenwich with several eye-pieces, saw a bright spot and rings round the planet with all of the eye-pieces, but the observations were somewhat hurriedly made in intervals between the clouds. Captain Tupman, who also observed at Greenwich, saw no trace of a bright spot upon the disc or rings around the planet. Mr. Dunkin, who was also at Greenwich, saw a bright spot at the centre of the disc, and, when the definition was at the best, saw a bright ring round the limb of the planet. Mr. Proctor who observed with a silver on glass reflecting telescope, saw a bright spot at the centre of the disc, and occasionally saw a bright ring round the planet; his daughter, to whom he had not mentioned the bright spot at the centre of the disc, saw it immediately upon looking into the telescope. M. de Boe, observing near Antwerp, saw a spot of light upon the disc, by no means central, but rather nearer to the limb than to the centre. Mr. Ranyard, observing at Dunecht, saw no spot on the disc, and no rings round the planet. Before external contact he swept the slit of a spectroscope slowly across the path in which the planet was approaching the sun's limb, but saw no trace of the planet in the field of the spectroscope until, after external contact, the viewing telescope, with the spectroscope, was directed to the part of the spectrum below C. When the planet was about two-thirds upon the Sun's disc, Mr. Ranyard observed it carefully with Lord Lindsay's fifteen-inch refractor, stopped down to ten inches, but no trace of a ring of light round the part of the limb of the planet outside the Sun's disc, or any indication of the limb, could be detected. Lord Lindsay observed external contact with a large prism in front of the object-glass of a six-inch refractor and a direct-vision prism behind the slit, so as to give a coloured image of the Sun's limb in the manner devised by Secchi. The limb of the planet was seen encroaching upon the C line of the chromosphere 13 s. before external contact with the photosphere, as observed with the same instrument.—Mr. Rutherfurd, of New York, exhibited two photographs of parts of the Sun's disc taken in 1871, which showed structure similar to the structure upon the photographs which have recently been taken by M. Janssen. Mr. Rutherfurd also exhibited a large photograph of the solar spectrum some ten feet in length. The photograph had been taken in several sections by means of a diffraction grating with upwards of 17,000 lines to the inch.

GEOLOGICAL SOCIETY.

May 8.—H. C. Sorby, Esq., President, in the chair.—Dr. C. P. Sheibner was elected a Fellow. — The following communications were read: "On the Glacial Phenomena of the Long Island, or Outer Hebrides," Second Paper, by Dr. J. Geikie,—"Cataclysmic Theories of Geological Climate," by Dr. J. Croll,—and "On the Distribution of Ice during the Glacial Period," by Mr. T. F. Jamieson.

May 22.—H. C. Sorby, President, in the chair.—Mr. J. Collins was elected a Fellow. The following communications were read: "On the Serpentine and Associated Ingeous Rocks of the Ayrshire Coast," by Prof. T. G. Bonney,—"On the Metamorphic and Overlying Rocks in the Neighbourhood of Loch Maree, Ross-shire," by Dr. H. Hicks,—"On the Triassic Rocks of Normandy and their Environments," by Mr. W. A. E. Ussher,—and "On Foyaite, an Elæolitic Syenite Occurring in Portugal," by Dr. C. P. Sheibner.

ZOOLOGICAL SOCIETY.

May 7th.—F. D. Godman, Esq., in the chair.—The Secretary read a Report on the additions made to the Menagerie during April.—Papers and letters were read: by Mr. T. J. Parker, on the stridulating organ of *Palinurus vulgaris*, — from Dr. F. B. White, "Contributions to a Knowledge of the Hemipterous Fauna of St. Helena, and speculations on its Origin,"—by Mr. P. L. Sclater, on *Fulibula Nationi*, a species of duck from Western Peru,—by Mr. A. G. Butler, on a small collection of Lepidoptera made at Kingston, Jamaica, by M. J. J. Bowry,—by Mr. E. A. Smith, on three new Land Shells from Jamaica and Borneo,—and from Mr. G. D. Elliot, on the Fruit Pigeons of the genus *Ptilopus*. Mr. Elliot recognised seventy-one species of this genus. May 21st.—F. D. Godman, Esq., in the chair. — Letters and communications were read: from Lieut.-Col. R. H. Beddome, on a new genus and species of Snakes, of the family of Calamariidæ from Southern India, proposed to be called *Xylophis Indicus*,—by Mr. P. L. Sclater, the tenth of his reports on the collection of Birds made during the voyage of the Challenger, containing an account of the birds of the Atlantic Islands and Kerguelen's Land, and of the miscellaneous collections made by the Expedition,—by Mr. J. W. Mason, on several new or little-known Mantidæ from India, Australia, and other localities,—by Mr. H. W. Bates, on new general ghd species of Geodephagous Coleoptera from Central America, belonging to the families Cicindelidæ and Carabidæ,—by Mr. G. F. Angas, on a new species of Tudicula, which he proposed to name *T. inermis*, — from the Marquis of Tweedale, the ninth of his contributions to the ornithology of the Phillippines, which gave an account of the collection made by Mr. A. H. Everett in the Island of Palawan, and contained the descriptions of nine new species: the collection likewise contained three examples of the remarkable *Polyplectron emphanes*, of which the locality was previously unknown and specimens were excessively rare,—and by Prof. A. H. Garrod, on the tracheæ of *Tantalus loculator* and of *Vanetlus Cayennensis*, and on the anatomy of the great headed Maleo (*Magacephalon maleo*).

SOCIETY OF ARTS.

May 9th.—J. C. Stevenson, Esq., in the chair.—A paper "On recent Improvements in Alkali Manufacture," was read before the Chemical Section, by Mr. Mactear.

May 14th.—Admiral Sir E. Ommanney in the chair.—A paper "On the Niger, Past, Present, and Future," was read before the African Section, by Mr. E. Hutchinson.

May 15th.—Lieut.-Col. Sir E. du Cane in the chair.—Six Candidates were proposed for election.—A paper "On Dietaries in their Physiological, Practical, and Economic Aspects" was read by Dr. Gorer.

May 17th.—J. Caird, Esq., in the chair.—A paper "On Agriculture in India," was read before the Indian Section by Mr. F. C. Danvers.

May 22nd.—W. Hawes, Esq., in the chair. Seven candidates were proposed for election as members.—A paper "On Controlling and Correcting Clocks by Electricity was read by Mr. J. Ritchie.

May 23rd.—Dr. J. H. Gladstone in the chair. — A paper "On the Position of Chemistry in a System of Technical Education, as Illustrated by some of its Applications," was read before the Chemical Section, by Mr. J. M. Thomson.

May 28th.—Admiral Sir E. Ommanney, in the chair. — A paper "On a Year on the Nyassa, with Notes on the Slave Trade, and on the Prospects and Means of Opening up the Surrounding Country," was read before the African Section, by Mr. H. B. Cotterill.

May 29th. — Rev. Sir G. W. Cox, Bart., in the chair.—Four candidates were proposed for election as members.—A paper "O the Recent Explorations in Mycenæ, Troy, and Ephesus," was read by Mr. W. Simpson, and illustrated by water-colour drawings and sketches taken by him on the spot.

MATHEMATICAL SOCIETY.

May 9th.—Lord Rayleigh, President, in the chair.—Messrs. W. M. Hicks, and T. R. Terry were elected members, and Prof. Minchin was admitted into the Society. Messrs. Briochi, Darboux, Gordon, Sophus Lie, and Mannheim were elected Honorary Foreign members. — Prof. Henrici communicated a paper by Dr. Klein, of Munich, "Ueber die Transformation der Elliptischen Functionen,"—Prof. Cayley spoke on the Theory of Groups,—Prof. Kennedy read his "Notes on the Solution of Statistical Problems connected witn Linkworks and other Plane Mechanisms," — Mr. Glaisher communicated a Generalised Form of certain Series,—and Mr. Kempe read a paper "On Conjugate Four-piece Linkages."

NEW SHAKSPERE.

May 10th.—F. D. Matthew, Esq., in the chair.—Mr. T. A. Spalding read a paper "On Elizabethan Demonology." It was divided into three sections. The first dealt with the general laws that appear to have operated in creating and modifying the belief in the existence of good and evil spirits. In the second section the actual belief of Shakspeare's contemporaries was discussed under three heads,—(1) the classification, (2) appearance, and (3) powers of the evil spirits. Under the first head the reader took occasion to point out the relation of "King Lear" to Dr. Harsnet's "Declaration of Egregious Popish Impostures." Under the third head the capacity to assume the various forms, human, animal, or divine, was discussed, with special reference to the transitional belief of the Reformation period on the subject of ghosts: the Conservatives believing in the return of disembodied spirits, the Reformers attributing such appearances to the machinations of the Evil One; and the manner in which the transition is reflected in "Hamlet." The second power was that of possession; and the various methods of exorcism were also described. The power of causing bodily diseases and the Incubus theory were also alluded to. The reader opened the third section by pointing out that the only difference between fairies and devils was the difference in degree of the evil they wrought. When a nation, as in the pre-Reformation times, has unity of creed, and its attention is directed to agricultural and domestic matters chiefly, its spirits take their tone from this, become fairies, mischievous in homestead and field. When, however, the ancient creed gets exploded, and men have to encounter for themselves theological doctrines, the belief is in spirits who are scheming destruction of body and soul. But the change first occurs in the towns; the old belief hangs on much longer in country places. Hence at both ends of Shakspeare's work, when he was most influenced by country life, we find fairy plays — the "Dream" and the "Tempest"; and in the middle, whilst his life was affected by town thought, we get the great tragedies in which devil-agency is so predominant. But the "Tempest" is not a mere return to the "Dream." Shakspeare's works seem to bear the impress of a mental struggle that most men have to undergo. The starting point for this is the first stage—of hereditary belief, where a man accepts unhesitatingly what he is taught—the "Dream." The second stage, when doubts arise as to the truth of the customary belief—the period of scepticism, is illustrated by the great tragedies, the leading feeling of which is that an overruling evil fate sweeps good and bad equally to destruction, that man is the toy of malignant beings. The third period, the period of intellectual belief, is illustrated by the "Tempest," where Shakspeare, Prospero-like, teaches that man, by nobleness of word and work, by self-mastery, may master this evil; that his great duty is to fight out the cause of truth and right in the present, to leave peering into the sleep that surrounds this little life, and make the world happier and better than he found it.

HISTORICAL SOCIETY.

May 9th.—Dr. B. W. Richardson in the chair.—Twenty-one members were added to the roll.—Prebendary Irons, D.D., read a paper "On the Transition from Heathen to Christian Civilisation, from the Times of the Antonines to the Fall of the Western Empire," which led to an animated discussion.—It was agreed that, consequent on the increased attendance, the Society should hereafter hold its monthly meetings in the large rooms of Dr. Williams's Library, Grafton-street East, which had been granted by the Trustees for this purpose.

PHYSICAL SOCIETY.

May 11th.—Prof. W. G. Adams, President, in the chair.—The Rev. P. Magnus was elected a member. — Mr. J. Norman Lockyer read a paper "On some Recent Researches in Solar Chemistry." — Sir W. Thomson described and exhibited the apparatus he has employed in recent researches on the influence of stress on magnetization. May 25th.—Prof. W. G. Adams, President, in the chair.—The following candidates were elected members: Messrs. W. Kieser, T. McEniry, W. R. Phillips, and G. M. Whipple.—Mr. D. J. Blaikley read a paper "On Brass Wind Instsuments as Resonators."—Dr. Guthrie placed on the table a communication on salt solutions and attached water, and on the separation of water from crystalline solids in currents of dry air, in continuation of his researches which have already been published.—Sir W. Thomson, in continuation of the communication made to the Society at its last meeting, described the effect of torsion on the electric conductivity of a tube of brass.

ASIATIC SOCIETY.

May 20th. — *Anniversary Meeting.* — Sir E. Colebrooke, Bart., M.P., President, in the chair.—The Viscount Cranbrook, Lieut.-Gen. A. Fytche, and K. Syumatsu were elected resident members. The following members were elected as the Officers and Council for 1878-9: Major-Gen. H. C. Rawlinson, *President* and *Director*; *Vice-Presidents,* Sir E. Colebrooke, Bart., J. Fergusson, B. H. Hodgson, and Col. Yule; *Council,* Sir E. C. Bayley, E. L. Brandreth, Dr. O. Codrington, Rev. J. Davies, M. P. Edgeworth, Sir B. Ellis, Sir D. Forsyth, J. F. Fleet, Major-Gen. Sir F. Goldsmid, A. Grote, Dr. W. W. Hunter, Col. N. Lees, Sir W. Muir, Col. Sir L. Pelly, and the Lord Stanley of Alderley; *Treasurer,* E. Thomas; *Secretary,* W. S. W. Vaux; *Honorary Secretary,* T. Chenery; *Honorary Librarian,* R. N. Cust.—The report of the Council stated that forty-one new members had been elected during the year 1877-78.

SOCIETY OF ANTIQUARIES.

May 16th.—The Earl of Carnarvon, V.P., in the chair.—Dr. Ogle was admitted a Fellow. The following gentlemen were appointed by the President Vice-Presidents of the Society: Dr. W. Smith, Lord Rosehill, F. Ouvry, Esq., and Lord Acton.—The Hon. R. C. Winthrop exhibited and presented a bronze medal in memory of the late George Peabody.—Mr. C. E. Davis exhibited a curious mask, stated to be of block tin, and a belt-shaped strip of the same material, which had been recently found in the city of Bath, twenty-five feet below the surface, inside a Roman hot-water drain, the top of which had fallen in. Considerable difference of opinion prevailed as to its date. By some it was considered Roman, by others it was regarded as a figure of an abbess of the seventh or eighth century, the period at which a nunnery occupied the site where it was found, while others again considered it was part of a coffin-portrait of the sixteenth century. Mr. Davis undertook to procure a correct analysis of the metal.—The Rev. F. E. Warren, by permission of the President and Fellows of Corpus Christi College, Oxford, exhibited an Irish missal of the twelfth or early thirteenth century, the property of that College. The ornamentation of the MS. would have suggested a much earlier date, consisting, as it did, of fantastic representations of interlaced lacertine animals, so often found in early Irish Art, as may be seen in the plates of Irish MSS. published by the Society in "Vetusta Monumenta." The missal was accompanied by its leathern case, or satchel, or "polaire," closely resembling that of the Breac Modog, figured in Miss Stokes's paper in the *Archæologia*, vol. xliii. p. 137. The first portion of the MS. is missing; it now begins with the Canon of the Mass at the words "Sæcula Sæculorum" (the concluding words of the *Secreta* before the *Sursum corda*). From the nature of the contents Mr. Warren inferred that it was rather the portable Sacramentary of an itinerant priest than an Altar Service Book. The nationality of the MS. is proved (1) by the Irish character of the writing and the Celtic features of ornamentation; (2) by the entry of an Irish name on folio 4, and an Irish gloss on folio 157; (3) by the presence of special *missæ* for St. Patrick and St. Bridget not in any Roman or English missals; (4) by the invocations of Irish saints in the various liturgies; and (5) by the presence of several unusual collects and petitions such as "Ut regem Hibernensium et exercitum ejus conservare digneris," a king whom Mr. Gilbert identifies with Torlogh O'Connor in the twelfth century. The great interest, however, of the volume consists in the presence of certain collects and prayers *not found in any other existing Missal*, and which Mr. Warren suggested might be remnants of that ancient Celtic liturgy which must have been in existence and in use in the first six or eight centuries of the Christian era, before Roman influence gained the mastery in Ireland.—A resolution was passed embodying the wish of the meeting that the Council would consider how far it would be practicable for the Society to publish the MS. in the *Archæologia* or otherwise. Only four such missals exist, and Mr. Bradshaw had expressed an opinion that it would be desirable the Corpus MS should be printed.—Mr. A. W. Franks communicated a paper "On the Brasses of Gloucestershire," in continuation of the series of papers, in the order of the counties, already laid before the Society. In connection with this paper Mr. Ouvry laid upon the table ten volumes of the late Mr. Boutell's collections of monumental and heraldic effigies.

May 23rd.—The Earl of Carnarvon, President, in the chair.—The Rev. J. Beck exhibited a clay spindle whorl found on Coates Common, near Petworth; a perforated stone hammer found on Parham Down; a green stone object of uncertain use, stated to have come from New Zealand; a triangular flint arrow-head from Denmark. — Mr. J. W. Grover exhibited a bronze looped celt and a looped palsleeve, and two fragments of pottery, part of a large "find" recently discovered at Worthing.—Mr. G. Payne exhibited a drawing of a lid of a Roman coffin, of lead, recently found, with other remains, at Chatham.—Mr. O. Morgan exhibited a very beautiful silver model of the first Eddystone Lighthouse, erected by Mr. Winstanley in 1698. This model, which was executed in 1699, had been among the plate of the Tredegar family a century ago. The cupola and lantern, in the model, served as a sugar-caster; at the bottom of the open gallery was the depression for the salt, the cupola acting as a cover. The state room below this was an empty box; but the store room was a perforated box for pepper, whilst the basement was simply an empty box, the whole, therefore, being arranged for sugar, salt, and pepper, with two vacant boxes. Mr. Morgan sketched the history of the first lighthouse, and showed that the model corresponded in every minute particular with the large engraving of it in Smeaton's great work.—Mr. J. D. Baldry exhibited the fragments of a very fine specimen of Egyptian art, consisting of the upper and lower portions, the head, bust, and legs of a bronze statue, of which the original height must have been about twenty-six inches. The exhibition was accompanied by some remarks from Dr. Birch, who considered from the treatment of the hair that it represented a functionary of the nineteenth dynasty. The bronze was cast on a core of sand, and it was a very remarkable circumstance that in this core was visible a rod of iron, showing that at that early period bronze had been cast round iron. Other examples of this practice, which ancient metallurgy, are discussed by Dr. Percy in his volume on Iron and Steel, and in Layard's "Nineveh" (1853), pp. 191, 670.—The Rev. J. Baron communicated on account of an interesting hoad of gold nobles discovered at Bremeridge, Wilts. These nobles, which were chiefly of the time of Edward the Third, furnished some valuable elucidation of the relations between England and Flanders at that period. Mr. Baron also showed what was the real meaning of the well-known motto on some of these nobles, "Jesus autem transiens," &c., which refered to Edward's narrow escape from his enemies in the naval engagement at Sluys, in the 1340.

BRITISH ARCHÆOLOGICAL SOCIETY.

May 15th.—Mr. T. Morgan, V.P., in the chair.—A description of the interlaced Saxon patterns of the Coplestone Cross, Devon, with a sketch of the arrangement, was rendered by Sir H. Dryden, and Mr. R. Allen described the efforts made to restore to the town the ancient Saxon cross found thirty years ago in rebuilding Leeds Church. It was removed to London by the architect of the church for preservation. Rubbings of its sides were exhibited, showing that the latter were covered with interlaced work and figures.—Mr. Mann described the ancient cloacæ of Roman Bath, which are still in use, and which have been recently repaired by him for the corporation. They are of great extent and massive construction.—Mr. Irvine sent a plan of Roman villa discovered several years ago near Tracey Park, Bath, remarkable for its being surrounded by an earthern rampart of rantangular plan.—Mr. Syer Cuming produced some forks of ancient date, and referred to some of Saxon workmanship of the ninth century found in Wiltshire.—Mr. H. Fisher exhibited photographs of churches and abbeys to be visited during the coming Congress at Wisbeach.—The Rev. S. M. Mayhew produced relics from recent excavations, among which were some remarkable glass objects found in London, with the refuse of glass works, pointing to their probable manufacture on the spot, a supposition which is strengthened by the finding of an instrument for moulding the shaped edges of similar glass vessels.—Sergeant Goodwin exhibited some remarkable plans of Stonehenge, and the results of a trigonometrical survey. This shows that the construction has been planned upon a triangle whose base is six miles in length. The points of the filling in angles are in every case marked either by earthworks or remarkable stones. The discussion of these unexpected results was deferred until the next meeting.—A paper, prepared by the Rev. R. E. Hoppell, was then read by Mr. de Gray Birch upon the discovery and excavation of the Roman station at the Lawes, South Shields. The remains are in danger of total obliteration, since the land is to be let for building purposes. Mr. L. Brock pointed out the analogy of this station to many others in the North of England, and on the line of the Roman wall. Is was a supporting station to that of Tynemouth on the opposite bank of the river, and its origin is to be considered as part of the design of the great wall. Like the stations, too, along its line, this one exhibits traces of destruction by fire and of reconstruction.

NUMISMATIC SOCIETY.

May 16th.—J. Evans, Esq., President in the chair. — Dr. T. Wise was elected a member. — Mr. Evans exhibited a copper coin of Cunobeline, found some years ago near Bologne, having on the obverse a head of Ammon and the inscription CVNOBELINI, and on the reverse a horseman bearing a round shield and the inscription CAM. (Camulodunum).—Mr. Frentzel exhibited an impression in copper from an unfinished die of a halfpenny of Charles the Second, with the portrait of Britannia, and without inscription; also a brass coin of George the First, having on the reverse Britannia seated, holding an orb and resting on a shield.—Mr. H. S. Gill exhited a penny of Henry the First, struck at Lincoln, with the inscription TOM ON LICOLIN.—Mr. B. V. Head read a paper, by M. J. P. Six, of Amsterdam, "On the Coins of Hierapolis in Syria," in which he attributed certain rare silver coins in various national and private collections to the High Priests of the great Syrian goddess Atergatis, who were also independent or semi-independent dynasts of

Hierapolis, in the times of the immediate successors of Alexander the Great.

CHEMICAL SOCIETY.

May 16th.—Dr. Gladstone, President, in the chair.—The following papers were read:—"On the Detection and Estimation of Free Mineral Acids in various Commercial Products," by Messrs. P. Spence and A. Esilmann. The method is based on the fact that peracetate of iron, even in diluted solutions, has a distinct yellow colour not perceptibly altered by acetic acid or solutions of persulphates, but instantly bleached by free sulphuric, hydrochloric and nitric acids. The solution is made by dissolving ten parts of iron alum and eight parts of crystallized acetate of soda in 1,000 parts of eight per cent. solution of acetic acid (twenty-five per cent.)—"The Action of Hypochlorites on Urea," by Mr. H. G. H. Fenton. The author has found that when urea is acted on by a hypochlorite in the cold, in the presence of a caustic alkali only half the nitrogen is evolved. From various experiments it was proved that the nitrogen remains behind as a cyanate.—"On the Behaviour of Metallic Solutions with Filter Paper and on the Detection of Cadmium," by Mr. T. Bayley. The author has investigated the action which takes place when drops of metallic solutions are placed on filter-paper, the extent to which the solutions spread being tested by sulphuretted hydrogen. In some cases the solution seemed to concentrate itself in the middle, in others round the edge, of the spot. Dilution, temperature, and the kind of filter-paper have an important influence on this phenomenon. The salts of silver, lead, &c., when moderately concentrated, give a wide water-ring containing no metal, while the salts of copper, nickel, cobalt, and especially cadmium, must be much more dilute to present the same appearance. This property of cadmium, to spread itself over the whole drop, is so marked that it affords an elegant means of detecting it in the presence of metals whose sulphides are black.—"On Essential Oil of Sage," by Messrs. Siguira and M. M. P. Muir. The oil consists mainly of two terpenes, one boiling 152-156°, the other 162-167°, an oxidized liquid, and a camphor. A small quantity of absolutely pure sage-oil has been examined and consists mainly of a terpene, boiling at 264-270°, of a dark emerald green colour.—"On the Action of Bromine upon Sulphur," by Mr. J. B. Hannay. The author has investigated the evidence as to the existence of any compounds of these two elements by boiling point, the spectrum of the vapour, specific gravity, and vapour tension. He concludes that the action of any quantity of bromine on any quantity of sulphur is an action on the whole mass, and not in multiple proportion; but that if at low temperatures the compound containing one atom of sulphur to two of bromine meets a body with which it can form a molecular combination—*e.g.*, arsenic—it assumes the crystalline form in conjunction with such a body.—"On the Determination of High Boiling-Points," by Dr. T. Carnelly and Mr. W. C. Williams. The authors have determined the boiling-points of various substances by observing whether or not certain salts fuse when exposed to the vapours of the boiling substance. The melting points of the salts have been determined by Carnelly. The salts are contained in capillary tubes.—"On High Melting Points, Part IV," by Dr. T. Carnelly. The author has perfected his (specific heat) method of determining melting points, and eliminated two sources of error. In the present paper he gives the melting point of over one hundred substances. He promises a paper embodying theoretical results deduced from the above observations.

INSTITUTION OF CIVIL ENGINEERS.

May 21st.—Mr. W. H. Barlow V.P., in the chair.—The paper read was "On the Design generally of Iron Bridges of very large Spans for Railway Traffic," by Mr. T. C. Clarke.

METEOROLOGICAL SOCIETY.

May 17th.—Mr. C. Greaves, President, in the chair. — Rev. D. Lamplugh, Messrs. A. H. J. Crespi, W. Morris, J. Muir, and Miss E. A. Dymond were elected fellows.—The following papers were read: "On the Daily Inequality of the Barometer," by Mr. W. W. Rundell.—"Meteorology of Mozufferpore, Tirhoot, for the Year 1877," by Mr. C. N. Pearson,—"Note on the great Rainfall of April 10th and 11th, as recorded at the Royal Observatory, Greenwich," by Mr. W. Ellis,—and "Observations of Sea Temperature at Slight Depths," by Capt. W. F. Caborne.

ROYAL SOCIETY OF LITERATURE.

May 22nd.—W. Knighton, LL.D.. in the chair.—Two papers were read—one contributed by Mr. J. W. Redhouse, and by Sir Patrick de Colquhoun. In the former, Mr. Redhouse traced the progress of the "Turkish race" from the earliest period to the present time; in the latter, Sir P. de Colquhoun treated of the population commonly called "Modern Greeks."—Mr. Redhouse stated that a branch of the race often called by ethnologists "Turanian," and consisting of a vast agglomeration of tribes or hordes from Chinese Tartary, about 1,100 years ago spread into the country west of the Oxus and Sea of Aral, extending their power and name almost from the shores of the Polar Sea to the confines of India. Their language was, and still is, generally, called "Turk-dili"—the "Turkish language," and, notwithstanding the wide expanse it covers, its dialectic differences are no impediment to its being generally understood over the whole of this geographical area. Mr. Redhouse then showed the connection between the Turks, Tartars, Mongols, &c., pointing out, also, that the present Shah of Persia is really of a Turkish family, and giving, at the same time, a general estimate of the present population of the Ottoman empire.—Sir P. Colquhoun, in his paper, maintained that the Greeks of the classical period had long been completely exterminated, and replaced by other, and, principally, by Slav tribes; and that 'Ρωμαιοι, or Romans, is the proper name for them, as that they bore under the Byzantine empire.

ANTHROPOLOGICAL INSTITUTE.

May 14th.—Mr. J. Evans, President, in the chair.—Capt. Dillon exhibited flint implements collected near Ditchley Oxon; and a number of others from the Drift gravel of the Lea Valley, near Clapton, were exhibited by Mr. W. G. Smith.—The following papers were read by the author, Prof. Rolleston: "Description of a Male Skeleton found at Cissbury by Mr. J. P. Harrison." The paper was illustrated by a semi-diagrammatis of the pit whence the skeleton had come; the principal part of the skeleton itself, some bones of ox, goat, pig, and red deer, and finally a large quantity of worked flints and some lumps of iron pyrites, were upon the table. Much help had been received as to the preservation of the skeleton from Dr. Kelley, the Medical Officer of Health for the district. There is no doubt the skeleton had belonged to a man with a markedly dolichocephalic skull, the length-breadth index being 71, but not tapinocephalic, the length height index being 76; his stature had been something under five feet, either as calculated from the long bones or by simple measurement of the skeleton as laid out and increased by the addition of one inch for calcaneal and cranial integuments. The age had been something between twenty-five and thirty, the absence of wear on the wisdom teeth being deceptive, owing to the non-development of one of the these teeth and the small size of another. The owner of the skeleton had suffered from infantile cerebral hemiplegia, the right humerus being half an inch longer, and the right radius 8-10″ longer, than the corresponding bone on the left side, while the femurs were equal in length, and the right tibia on 2-10″ longer than the left. The pathological condition, however, did not account for some very striking characters of the limb-bones, which were equally prominent on both sides of the body; these being the platycnemy of the tibiæ, the anterior convexity and from side-to-side flattening of the humeri, &c. Altogether the osteological peculiarities of the skeleton were as distinct evidence for its antiquity as its mode of burial.—"On the Excavations of three Round Barrows at Sigwell, near South Cadbury, in the parish of Compton, Somerset." These three round barrows belonged to the Bronze Age, no trace of iron, except such as had been accidentally and demonstrably introduced, being found in any of them. The interments in them had been in the way of cremation, and in one case the ashes had been gathered into a bark coffin, and a bronze dagger placed with them: in another the ashes occupied an area of only 1′ in diameter; and in both cases the bones had been carefully picked out of the embers of the funeral pile and interred apart, though in neither case in an urn. Fragmentary pieces of coarse pottery, however, were found here and there throughout the mass of the barrows; and though there were no flints to be found in the immediate neighbourhood, great abundance of chipped flints and some scrapers were found, and notably one very beautiful one by the Rev. J. A. Bennet, to whose assistance very much of the success of the exploration was due.

A READY MEANS OF ESTIMATING THE VALUABLE CONSTITUENTS OF CEREALS, &c.

By means of a very ingenious method, first discovered by Mr. A. A. Hayes, of Roxbury, and Dr. Chas. T. Jackson, of Boston, U.S., it will be found that if a kernel of corn be split longitudinally, and immersed in an aqueous solution of sulphate of copper, the germ, or "chit," only, becomes coloured green, thereby beautifully defining the limits of the phosphates by the formation of phosphate of copper. The same process may be applied to all seeds (except those of an oily nature), tubers, roots, and stems of vegetables for defining the parts containing phosphoric acid.

If a kernel of corn be split open, as before described, and thrown into a solution of sulph-hydrate of ammonia, the "chit" will soon be changed to a dark olive colour, which is due to a change of the salts of iron in the seed to a sulphuret of that metal; a dark-coloured matter forming with the ammonia turns the vegetable colouring matter yellow, and the two colours combined produce an olive. Again, by taking split specimens of corn, or other grains, and soaking them in a tincture of iodine, the limits of the starch and dextrine will be distinctly defined—the iodine striking an intense blue with the starch, and a deep port wine red with the dextrine; so that, from this test, a rich violet (being the combination of the blue and red colours) will indicate the presence of both the starch and the dextrine in the grain. If the oil be extracted from the transparent horny part of the corn by means of alcohol or ether, the tincture of iodine will show the presence of starch in that part of the grain, associated with the gluten. By these means we may easily cause any of our cereal grains to represent to us the extent and precise limits of its phosphates, iron, dextrine, starch, and oil; and thus, by the eye alone, we may form an approximate estimate of the relative proportions of these ingredients.

Among other curious results of some experiments made by Dr. Jackson is the proof that the relative proportions of the phosphates in grain depend on the appropriating power of each species or variety; for on an ear of corn having been selected which had on it two different kinds, namely, the Tuscarora and a variety of sweet corn, and these seeds having been split and immersed in the same copper solution, soon gave evidence that there was more than double the amount of phosphates in the sweet than there was in the Tuscarora variety. Now, since the kernels came from the same ear, and grew side by side, they obtained unequal amounts of phosphates from the same sap, derived from the same soil. A crop of sweet corn will take twice as much of the phosphates as the other variety, and consequently will sooner exhaust the soil of them.

Some interesting facts were observed, too, in the variable proportions of phosphates in different varieties of the same species of other grains. The fact that the smaller grains, such as wheat, oats, and barley, contain so much less than Indian corn would seem to explain their peculiar properties as food for animals; the more highly phosphatic grain being more likely to surcharge the system of adult animals with the elements of bony matter, producing concretions of phosphate of lime, like those resulting from gout. Perhaps that stiffness of the joints and lameness of the feet common in horses fed too freely with corn may be accounted for by this preponderance of the phosphates. Young animals cannot fail to derive more osseous matter from corn than from any other food.

FOREIGN SCIENCE.

The Meteorological Division of the Observatory of Paris has been engaging a good deal of attention lately. It takes the title of the Central Meteorological Bureau. This service comprehends the study of the movements of the atmosphere, the meteorological warnings at the ports, and for agriculture, organisation of meteorological observations, and regional and departmental commissions, the publication of these works, and the whole researches of meteorology or climatology. The scientific works are as follows:—(1.) Service of warnings for ports and agriculture. (2.) Service of general movements of the atmosphere. (3.) Service of climatology and inspections. The chief meteorologists of the service meet once a month, on a fixed day, in committee, under the presidency of the director. This committee can be brought together on the convocation of the director. In some cases, departments or towns contribute to the expense of a meteorological observatory.

There is a Council of the central meteorological bureau, composed of (1) a representative of each of the ministries of agriculture and commerce, public works, war, marine, foreign and exterior affairs, and administration of telegraphic lines. (2.) Two delegates of the ministry of public instruction. (3.) Two members of the Academy of Sciences. (4.) The meteorologist charged with the functions of the director of the central bureau.

The French Association for the advancement of Science will hold its annual congress this year at Paris. The date of opening is 22nd of August. The programme of the session has been studied by a special commission, composed of members of bureau, members of Council of Administration, and a delegation from the Municipal Council of Paris. The locale admirably chosen is the Palace of the Beaux Arts—rich in grand saloons where all the sections can hold their sittings. The president will be M. Fremy. His address is 76, Rue de Rennes, Paris. Above particulars are from *Les Mondes*. In regard to our meteorological services, it is worth while to consider if some similar action should be taken in this country.

The *Correspondance Scientifique* describes a magnificent elementary geographical department as one of the features of the Exhibition. Maps of all kinds are a particular feature. Attention is now being bestowed on this science in France, which was formerly somewhat neglected. This paper describes, from an American paper, application of the telephone to a baby crying in the night—when it cries the cradle is rocked till it ceases. This invention was made at the desire of a lady, who found it inconvenient to rise in the night. Our American friends certainly show a praiseworthy desire to forward invention in every department.

Les Mondes quotes, very extensively, Dr. Siemens' speech, at the meeting of Telegraph Engineers, on 23rd January, on the last actual application of electricity, besides those of telegraphy. The subject of temperature of flames has been engaging much attention. These include luminous flames of gas, non-luminous flames of gas, as produced by an ordinary Bunsen burner; gas flames by Bunsen, to demonstrate the absorption of yellow rays, produced by vapours of sodium, flame produced by stearine *bougie*, flames of the Locatelli lamp, petroleum flame, alcohol flame, mixtures of air and gas for lighting in determined proportions, mixtures of azote and lighting gas, mixtures of lighting gas and carbonic acid.

Mr. Hughes, the ingenious inventor of the *telegraph imprimant* used on the French lines, has deserved much praise, say the French magazines, for the microphone. The microphone is an amplificator of sounds in distinction from the telephone. Fog signals are another topic—the memorandum of Professor Tyndall on the subject read at meeting of Royal Society, on 21st March, being quoted in extenso. The Elder Brethren of the Trinity House are described as having brought the methods of using these to great perfection. Our readers will rememember there was a great series of experiments made by them at South Foreland, in 1872.

The principal laureates at the Union of learned societies this year at Paris were—Gold medallists — MM. Honel, of Bordeaux; Hannand, naval Doctor; Terqueue, of Lille; Cailletet, of Chatillon-sur-Seine; General Nansouty (observatory of Pic du Midi.) Silver medals — MM. Tunbal-Lagrave, of Toulouse; Jousset, of Bellesme Nantes; Fontannes, of Lyons; Hébert, of Moulins, Saint Germain of Caen.

The Abbé Debaize, whom we described as undertaking the French exploration of Africa, was born in 1845, and was made a priest in 1872. He has since been studying oriental languages. He speaks Arabic, Coptic, and the principal languages of the Coast of Africa. Viscount Emanuel de Rouge, Professor of Egyptology in College de France, traced his plan of studies for him.

The exact figure of the expense of construction of the Great Exhibition is now known. The total was 45,300,000 francs. It is more by 10 millions than the provision which were stated in the project presented to the Chambers in 1876. The receipts are equal. The defect will be about what was foreseen in 1876—10 millions.

The great hall of the Trocadero, where the fêtes are held, can contain 5,000 persons, and the ventilation has been scientifically accomplished. During the heats, when the thermometer marks in the interior 30 degrees centigrade, the temperature of the hall will not surpass 20 degrees. The cooling will be obtained by injections into the hall of 200,000 cubic metres of air—at one time an equal quantity of vitiated air will be extricated from it by means of aspiration. The fresh air descends uniformly to the soil, and is evacuated by 5,000 equal mouths, coming out under the surface of the parquet. The air comes from the top of the hall, from the centre of the cupola.

Correspondence.

COAL WASHING.

TO THE EDITOR OF THE SCIENTIFIC AND LITERARY REVIEW.

Sir,—In reading 3rd column page 78 in the Scientific and Literary Review for current month, my attention was drawn to the subject of coal washing, &c. A question arose in my mind as to what can be done to utilize the coal dust sediment, which has to be thrown away when unfit for washing. I would suggest that the said water be allowed to run into a tank: then, with a crane or otherwise, introduce a cageful of coarse coke. Let it remain long enough to take in as much of the water (holding coal dust in solution) as it would contain. Then lift it and drain it over the tank: then lay it aside to dry. It may be used for several purposes. The cage should be of wrought iron bar work, and so constructed as to let out the coke from the bottom or end with ease, so as not to crush the coke. The suggestion is rather questionable; yet possibly, if made to those who are interested in coal washing, &c., they may try the experiment. There are doubtless several ways of "combing" the coal-dust with coke, and thereby lessen the waste and prevent river pollution, &c.

Apologising for trespassing on your valuable time with a subject that I know practically nothing of,—I am, &c.

J. Davies.

38, Jolliffe-street, Liverpool.
May 23, 1878.

MANUFACTURE OF CHLORIDE OF LIME.

A new process for the expeditious manufacture of chloride of lime has been invented by Mr. E. Maletra, of Paris, which consists in the employment of mechanical means for stirring, agitating, or mixing the powdered lime and the chloride of lime as fast as it is formed, in such a manner as to expose all the molecules of these substances in succession to the continuous action of the gaseous chlorine, which is introduced under favourable conditions for combining with the lime, and is rapidly absorbed by the latter. In order to insure regularity, it has been found necessary to couple at least two apparatus together, so as to admit of the chlorine being directed into either as required. The process is very rapid, and is carried out with great facility, and without any waste of chlorine. The progress of the operations may be constantly watched by persons near the apparatus, which emits no injurious odours. The apparatus is cheap in construction, and occupies but small space. The manufacture may be regulated at will, as examples of absolute homogeneity (as may be ascertained by testing) may be taken at any time during the operation. As the chloride of lime manufactured in this manner is homogeneous in every part, it is not liable to become decomposed, as is the case with chlorides manufactured in layers, more or less deep, and in a state of rest, and a source of considerable loss is thereby avoided in the manufacture of this product, which is liable to deterioration from the influence of climate and other influences resulting from its composition.

A new fire escape, patented by Messrs. John Swank and Arnold Jehnke, of Denver, Colo., is of the class in which the downward motion of the person is checked by means of a friction clutch attached to the drum carrying the rope by which the descent is made. It has, in addition to a spring acted clutch, a further safeguard in the shape of a brake operated by a nut, to be used in case the clutch proves insufficient.

RECENT AMERICAN AND FOREIGN PATENTS.

Mr. L. P. Taylor, of South Orange, N.J., has invented an improved type holder for hand stamps in which regularly received changes are made. The type box, having one or more compartments, is provided with lifters and followers which raise the type in turn, as desired, in a simple manner.

Mr. Jonathan Miller, of Hinrad's, N.Y., has improved upon the apparatus for making tea or coffee, previously patented by him, by modifying its form so as to adapt it to be made of stoneware.

An improved latch, for barn doors and similar positions, has been patented by Mr. B. Hollingsworth, of Sigourney, Iowa. It consists of a pendent bolt dropping into blocks on the door casing and locking the latch proper, which is opened by a spring from the outside, as usual. The bolt is raised or lowered by means of a cord, which is carried by pulleys to a convenient and concealed terminus.

Mr. H. L. St. Clair, of Vineland, N. J., has invented an improvement in hand washboards. The bed, or friction surface of the board, is formed of rollers, which are square or polygonal in cross section. The labour of rubbing clothes on such a surface is obviously less than on a fixed surface. One of the side bars of the washboard is provided with a hinged section, which permits the rollers to be easily put in or removed as required.

A new Fire Escape has been invented by Mr. Sylvester Root, of Rentland, Ind. A drum, having two separated grooves, in which ropes are attached so as to wind in opposite directions, is mounted in a frame which is hinged at the side of the window casing, so that it will swing into and out of the window. The free end of the swinging frame is provided with hooks to catch on a bar which spans the window casing transversely, and serves to support the frame when the drum and ropes are in use.

Mr. F. E. Gordon, of Concord, N. H., has invented a strong and simple clamp for general use. At the lower end of the standard a bevelled head is formed, which fits into a dovetail slot in an iron strip let into the bench. The sliding arm of the jaw is operated by an eccentric lever, which is shaped so as to prevent it from turning when the jaw is under pressure.

A new process and apparatus for extracting glycerin from fats has been invented by Mr. Frederick Sahlfeld, of New York city, who employs steam for the purpose of mixing the fatty matter and chemicals; not by direct action, but indirectly by the use of revolving steam-heated stirrers, the mechanical action and the contact of the surfaces of the stirrers with the fatty material expediting the separation of the glycerin.

An improved chimney cowl consists of a pipe closed at its upper end, and having lateral discharge openings near the top, and surrounded by a thimble, between which and the pipe are formed vertical passages for the discharge of smoke and movemnet of wind. This device has been patented by Mr. J. W. Androvatt, of Prince's Bay, N. Y.

Mr. Moritz Leiner, of New York city, has patented an improved brush, for bathing and other purposes, composed of a series of round brushes made of bristles retained in twisted wire strands, the brushes being attached to flexible bindings at the ends, and provided with a suitble handle.

A convenient device for sizing rings, intended for the use of jewellers, has been patented by Mr. Edward Davies, of Brooklyn, N.Y. It consists of a die plate having a number of tapering holes of different sizes, in connection with a corresponding number of tapering punches having annular recesses at the ends, fitting the different sizes of rings, and either contracting or expanding them by driving them into the die holes.

An improved heating stove, invented by F. J. Gould, of Sidney, Ohio, is of the double magazine, base-burning type, and is intended for burning soft coal. In the old styles of double magazine stoves the gas generated in the inner magazine had no other escape but the top of the stove, so as to vitiate the air; this is prevented by an arrangement of draught holes of the outer magazine. Other advantages are claimed.

Mr. G. W. Gomber, of Hazleton, Pa., has patented an improved bottle stopper, which is operated on the same general plan as the De Quillfeldt stopper, but made compound with a different hanging of the eccentric lever, and with new details intended to give increased durability.

THE SURREY GARDENS.

The Surrey Gardens—originally the largest zoological exhibition in London—the scene of Jullien's triumphs, and where Paganini and Weber once performed—are to be built upon. Messrs. Sutton and Dudley, the well-known architects and builders of the "Palatinate" and "Albany," have purchased the freehold, and are now erecting similar mansions on this site. The object of these palatial buildings, suitable for the middle classes, is to combine the comforts of a home, at a considerably reduced rent, free from the numberless disadvantages small property entails on the tenant. The Palatinate and Albany are fitted up with every conceivable convenience: water and gas are laid on, a shoot connects each kitchen to prevent any accumulation of rubbish, and by a new system of ventilation a continuous current of air is passed through the buildings. The ascent is made by a noble stone staircase, in the hall of which pneumatic tubes, similar to those used in large hotels on the Continent, connect each letting. These buildings have been visited by both scientific and medical men, who testify as to the application of all new principles in science and hygienic effects necessary and pertaining to the comforts and maintenance of health.

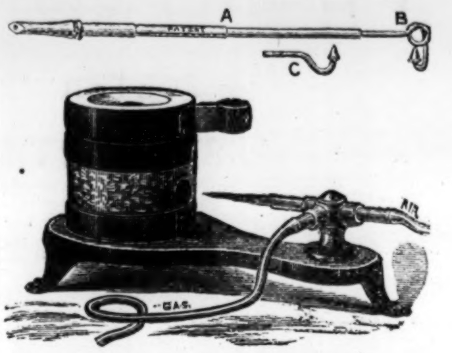
We understand that Messrs. Sutton and Dudley are about to hand over the concert hall of the gardens to the south of London as a library and reading room. This princely gift will be an incomparable boon to the inhabitants, and we trust the wealthy residents of the county of Surrey will exhibit an example in munificence for the support of such a necessary addition to the cultivation of the arts and sciences, of which a library is the first step to the development of genius.

SOUVENIR AT BELAIR VILLA.

My souvenir is a swan's quill,
That writes my thoughts and speeds my will;
And on its feathers flowers fair
Are painted, beautiful and rare.
A robin, too, amid the flowers—
Now snows are o'er—pipes out the hours:
And so whene'er I take my quill
As if to write, my fancies fill
The flowers with life, a sweet perfume
Pervades the air, and fills my room;
While, 'mid the light, the robin sings,
And bathes in joy his tender wings.

Henry George Hellon.

Solid-hoofed Pigs.—Dr. Coues states that a breed of solid-hoofed pigs has apparently been established in Texas. The terminal phalanges of the toes are united to form a single broad phalanx; above this, however, the other two phalanges remain perfectly distinct. The hoof is perfectly solid, and on its sole there is a broad angular elevation of horny substance, which is curiously like the frog of the horse's hoof. The breed is so firmly established that no tendency to revert to the original and normal form is observable. It is further stated that, in the cross of a solid-hoofed boar with a sow of the ordinary type, a majority of the litter have the peculiarity of the male parent.



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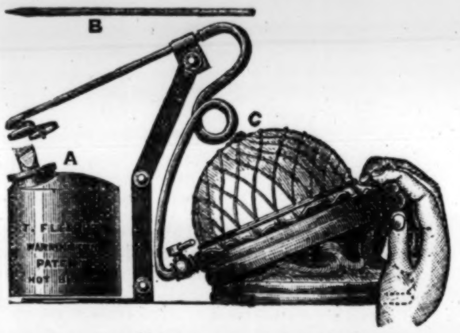
Will melt 8 ozs. Gold, Cast-Iron, &c., in a few minutes. Can be used for cupelling or roasting, and the burner for glass-blowing, brazing, &c.



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